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# *The Scottish Naturalist*

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*A Journal of Scottish Natural History*

# THE SCOTTISH NATURALIST

Founded 1871

A Journal of Scottish Natural History

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Although the journal's main interests have always centred on the history and distribution of Scottish fauna and flora, it is prepared to publish contributions on the many aspects of Scottish natural science embraced by its title, including Zoology, Botany, Geology, History, Geography, Archaeology, and the Environment.

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THE SCOTTISH NATURALIST

Volume 104

1992



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Founded 1871

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With which is incorporated *The Annals of Scottish Natural History*  
and *The Western Naturalist*

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104th Year

1992

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## TAIL DEFORMITIES IN BROWN TROUT: A FURTHER OBSERVATION

By A.A. LYLE

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and P.S. MAITLAND

*Fish Conservation Centre, Stirling*

From as far back as 1871 (Peach, 1872; Thomson, 1872) observations of Brown Trout *Salmo trutta* with stunted, rounded tails have been recorded from a few freshwater lochs in Scotland. Such deformities appear to signal the eventual extinction of fish from these lochs.

The available records were recently collected and discussed (Campbell, Maitland and Lyle, 1986) with particular reference to their link with the acidification of freshwater lochs. Of the seven lochs identified, two are in Islay and five are in Galloway. Because of acidification (Maitland, Lyle and Campbell, 1987) trout are now extinct in five of these lochs (two in Islay and three in Galloway), and their continued survival in the two other Galloway lochs appears to be threatened (Campbell, 1987).

The purpose of this present paper is to record a further observation of tail deformity at another site in Galloway.

During a survey of fish on the Silver Flowe National Nature Reserve, a specimen of Brown Trout showing extensive tail and fin deformity was collected from a small peat pool NX 474827. This pool (0.1 ha) has organically stained water (Hazen 100) and is very acid (pH 4.9). It has no permanent inflow or outflow and is isolated from a nearby river, the Cooran Lane, except perhaps during high floods.

Two Brown Trout were caught here on 31st July 1987 by gill netting. Shoreline electric fishing had been carried out on the previous day but produced no fish. One of the trout was immediately recognisable as having the characteristic structural deformities of caudal and other fins described in the earliest reports (Peach, 1872; Thomson, 1872). The other trout had none of these particular fin deformities, but did have a severe spinal distortion. However, a sample of twenty Brown Trout taken from the Cooran Lane (also pH 4.9 at that time) showed no sign of deformities. Examples of each are shown in Plate 1.

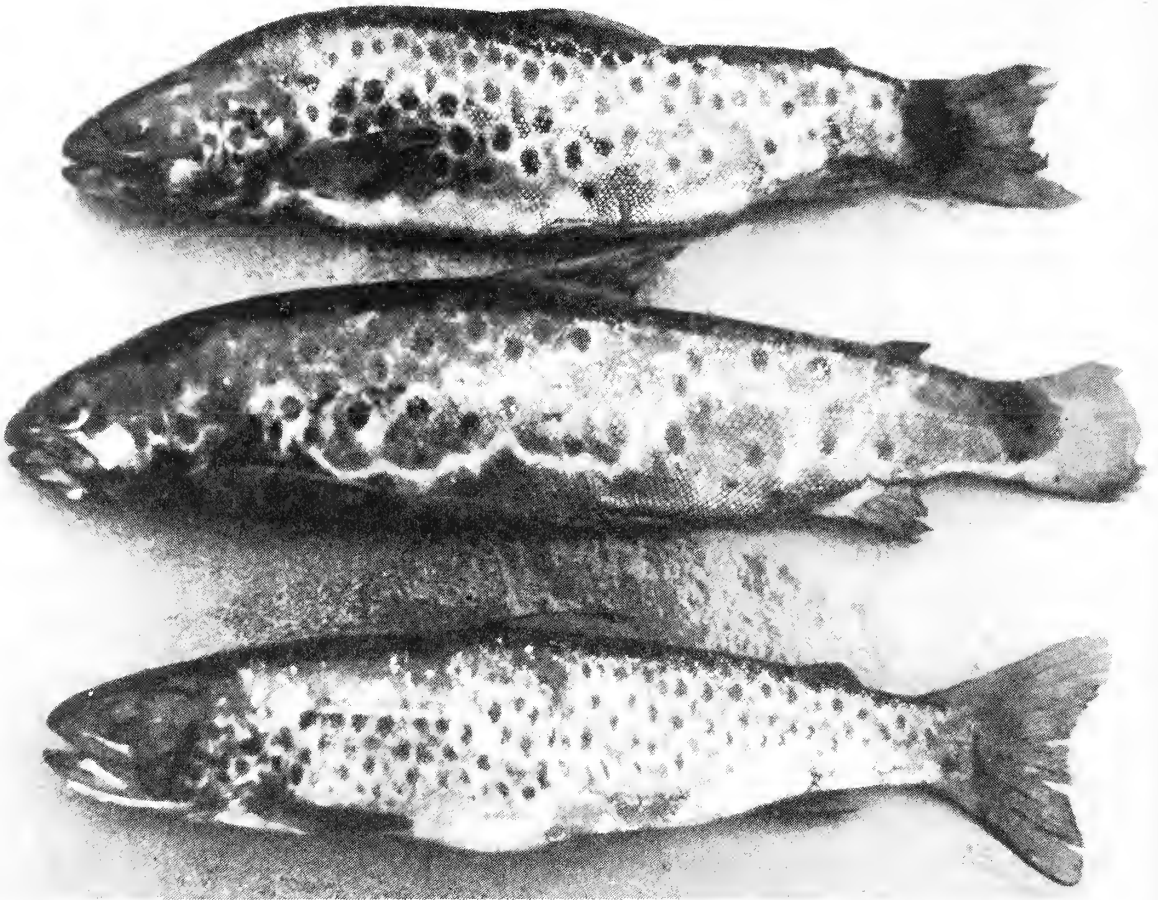


Plate 1

Of the three Brown Trout shown above, the top two were taken from the small peat pool. The centre fish shows the characteristic tail deformity described in earlier reports, and the top fish has a spinal distortion.

The lowest fish is an 'unaffected' example collected from the Cooran Lane river.

The origin of these two trout in the pool is not known, nor, perhaps more importantly, is it known how long each of them had been there. They are unlikely to have originated there, since the pool has no suitable spawning areas and there is therefore no viable trout population at risk. The most probable source is the Cooran Lane during flood, but unfortunately, without this information, the specimens are unhelpful in answering pertinent questions, such as whether the onset of such deformities occurs only during early growth, or whether mature fish will develop them simply from exposure to consistently acid conditions.

The granite areas of south-west Scotland were recently identified (Maitland, Lyle and Campbell, 1987) as being the most vulnerable in the country to freshwater acidification, with resultant damage to fish stocks, so it is likely that other waters in this area will also contain deformed fish.

There is clearly a case for further study, both here and in other countries where the acidification of fresh waters is also a problem, but an earlier request for information on similar occurrences in other parts of the world (Campbell, Maitland and Lyle, 1986) has not, as yet, produced any response.

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## THE ROMANS AND STRATHCLYDE: THE ROAD SYSTEM

### 5. LOUDOUN HILL AND THE HIGHLAND BOUNDARY FAULT FRONTIER

By FRANK NEWALL and WILLIAM LONIE  
*Renfrewshire Natural History Society*

#### Introduction

As indicated in our previous paper (Newall and Lonie 1991) this fifth paper in the series on Strathclyde Roman roads presents the results of our subsequent investigations on Route B north, and then continues with a description of Route system D, i.e. from Loudoun Hill extending to the Highland Boundary Fault frontier.

The argument for a Western Command road has previously been presented, with a summary of research results (Newall 1975: 83-84, 90).

By 1976 the course of the road north of the Clyde had been well established, thus rendering essential the discovery of a link with Loudoun Hill. Accordingly, in February of that year we motored back and forth around Loudoun Hill until a stretch of cambered road was located.

In 1977 our postulated intermediate fort north of the Clyde was located at Drumquhassle by R.C.A.H.M.S. Air Survey, but to date the fort south of the river remains undetected.

In 1983 the road between Malling and Bochastle was revisited, along with Dr. T. Martin Allan. As a result of his suggestions and research, additional lengths were recorded between Easter Dullater and Easter Gartchonzie, the course north of Mondowie was corrected to pass to the west of the boundary wall, further lengths were mapped north of Malling, and knowledge of the road to the south was extended towards Gartrenich. These lengths are accepted. Further suggested routes are mentioned in the text.

In the following surveys much was covered with Mr. Duncan MacKinnon and Mr. Harry M. Sinclair, while the Clyde crossing was mapped with Mr. Neil Holt.

## ROUTE B. NORTH SECTION

## Loudoun Hill to Barochan Hill

There now follows our detailed report on Route B north, a preliminary account of which appeared in part four of this series (Newall and Lonie 1991). Viewed from the A71, four paths from the general direction of Newlands farm converge on a crossing point on the River Irvine, NS 60353746. Two equidistant banks may flank a former road or a droving strip.

**Tongue Burn to Glen Water:**

The first recognisable road, however, approaches the Tongue Burn west of Harelea Hill. There a terraced descent of the south bank fronts a metalled tongue reaching from a cambered length to the north, NS 59653889. To the south-east regular high rigs are interrupted by a narrower rig which, at the south-east end of the field reaches a gap in the boundary and continues across the next field as an obvious linear mound. The course may be further indicated by track and field boundary, NS 59823860 to NS 59973829.

North-west of the Tongue Burn, traces fade, but the alignment is maintained by field boundary and corresponding gates to the Broomhill to Underlaw road. Between this and the road to the north, NS 59553905 to NS 59343927, a low mound runs between rigs at right angles. At the north end of the field this passes into a fenced-off marsh. Probing showed that road metal persists to reach the road south of Berry Hill, beyond which are faint hints of continuation. Topography suggests a more northerly deflection, ultimately reaching for the spur extending west of the Calder Burn towards Braidley Moss.

Over this wet moss, traces are lost in peat over 1.0 metre deep. East of a turf-dyked enclosure, NS 58954182, a trace of mound rises north of the Loch Burn, but a hard track follows the east side of the boundary only towards Whin Knowe, where it deflects, NS 58954188, N.N.W. towards Lamb Hill, NS 58854210, again as a slightly mounded track.

The moss at the head of the Wise Burn is blank, although two minor streams dammed back with downfall edge to the west (as at Slouch Moss, Route B south), aligned with a plank bridge, are suggestive.

**Glen Water to High Overmuir:**

Approaching the Glen Water the camber is apparent from NS 58654268. This skirts the east side of Hole Craig, and hollowing of both banks of the Glen Water leads to a broken



mound heading N.N.W. towards Black Hill. Since there is no obvious hollow feature near the Craig, it is possible that the adjective Hole refers to a once-recognised road (*Heol*, Welsh = road or track).

The mound yields to a hard track joined by tracks from Laigh Overmuir farm followed by hollow ways. This complex skirts the outfield boundary of the farm and south of Black Hill, NS 58154355, turns north-west where, on the approach to Auldhouse Burn, the road camber is recognisable since tongues project down both banks accompanied by a hollow way. A ruinous wooden bridge marks the crossing, NS 57934375. Just to the north, a drain section (in 1976) revealed a lens of metal-stiffened reddish clay, 24 feet (7.3 m) wide and some 7.0 inches (18 cm) thick, beneath 6.0 inches (15 cm) of peat.

The road is traceable towards High Overmuir, with hollow way flanking the east side. On Quarry Hill, NS 57534420, it deflects N.N.W. Borrow pits lie along the west side as the complex enters rigged enclosures. The rigs cut through hollow way and road mound, now reduced to 11 feet (3.35 m) by the 16 feet (4.9 m) hollow, but beneath the 6.0 inches (15 cm) of peat blanket the 7.0 inches (18 cm) thick clay road is, at maximum, c. 24 feet (7.3 m) wide.

To the north the hollow way curves off to run in with the 'coach' road, which has reached High Overmuir from the south via Longgreen, and which now crosses our line south of High Overmuir to continue as a broad, in places deep, hollow over the spur of Crook Hill, before converging again on the Roman line south of Myres farm (Moir 1975: Route 88, Eaglesham to Darvel).

#### High Overmuir to Myres Burn:

Beyond the north boundary of High Overmuir, the Roman line vanishes, NS 57304471. However, a faint terrace passes N.N.W. round the lower spur of Crook Hill, NS 56704545 to NS 56604590. Towards the north this carries a much dissected mound, c. 18 feet (5.5 m) wide, supporting a 'path'.

South of Myres Burn there is a minor but steeply banked stream, formerly crossed by a plank bridge. The section exposed was trowelled (Figure 11, section a). The stony clay subsoil had been terraced to a width of 18 feet (5.5 m). On this was laid a striated bank of peat and clay, c. 18 feet (5.5 m) wide, to support a mound of crushed barytes some 8.0 inches (20 cm) thick at the centre but only 12 feet (3.5 m) wide. The overlying peat, reduced to 4.0 inches (10 cm) by secondary traffic, had a spread of cobbles just below the surface. A

small barytes mine lies close to the Myres Burn, NS 56884623 (Lonie and Newall 1976: 54).

North of the stream, NS 56584615, a section cut by a deep drain showed clay and peat bedding, 22 feet 3 inches (6.8 m) wide, while the near recent cobbling was 9.0 feet 3 inches (2.8 m) wide above the 12 feet (3.5 m) boulder clay road (Figure 11, section b). It would seem probable that the minor stream had been culverted, the striated bank having been constructed to carry the road over it on a raised approach, as on the Nith road (Route E south) and on the road east of Gatehouse of Fleet (Route G). We consider the cobbled road to be a later alternative to the 'coach' road over Crook Hill, which must have been almost impassable in inclement weather. A slight inclination west would direct it towards residual bridge piers on the Myres Burn, NS 56604620. While the Roman mound is no longer visible, a direct course would bring it to a ford, just upstream of the bridge shared by a hollow way which crosses from the west. The 'coach' road converges, to cross by a ford higher up. Between this and the Roman crossing there is a constructed 'backlash' fall.

#### **Myres Burn to Carrot Burn:**

North of Myres Burn the roads are superimposed, but the hollow way, now a deep drain, passes along the east side flanked by several borrow pits, to curve north-east round Myres Hill. The 'coach' road and secondary cobbled track combine as the present road to Carrot, while the Roman road eventually rises to pass under sheep pens south of Myres farm, NS 56624646. From the flank of Myres Hill, Loudoun Hill to S.S.E. and Ballageich Hill to N.N.W. are in full view.

From the sheep pens, a 24 feet (7.3 m) wide camber crosses the first of two infields west and north of Myres to NS 56564666, then flexes slightly north towards the mapped disalignment of the west boundary of the fields at their junction, NS 56534678. The boundary originally ran straight, as a turf dyke later replaced by the offset mapped fence line, now a series of rotted stumps. The Roman mound is obliterated by the spread turf dyke, and beyond is almost lost in deeply trenched plantation, but between the forested strip and a south tributary of the Carrot Burn there is a distinct terrace, which draws nearer to the stream, the more westerly of two, until at their confluence, NS 56554725, terrace and main tributary to the west run side by side.

This terrace was cut by recent (1982) forestry drains, and several good sections were exposed. One such, c. NS 56554705, is illustrated (Figure 11, section C). Here the 30 feet (9.1 m)

road bed rose to a mound some 22 feet 6 inches (6.9 m) across. The terrace had been cut through dense black peat, a regenerative growth of lighter brown peat, thinning to 5.0 inches (12.6 cm) over the mound, being clearly distinguishable. The mound of grey clay, slightly lighter in colour than the subsoil, showed small stones in content. A drain along the east side is comparatively recent. This was recorded on 13th November 1982, following a dry season. A revisit, on 5th March 1983, when the moor was sodden, was a salutary experience (Figure 11, section d). The peat was dense black throughout, and only by trowelling could the terrace edge be detected. The wet clay mound was of a colour similar to the subsoil, and the small metal was masked in the smeared side.

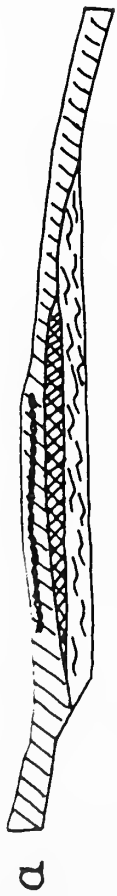
Experience has shown that where upcast clay or till is immediately replaced, it coalesces with the matrix. Apart from metalling, the clay road south of Maidengill (Route C east) and west of Duneaton ford (Route C east) was as the subsoil. A pipe line section through the road south of Loch Thom (System A) revealed a hump indistinguishable from the clay subsoil at a point whence the peat had been removed from the road bed.

Towards the confluence of the tributaries, NS 56554725, the terrace levels off, and beyond the junction only a broad strip of hummocky ground runs to the Carrot Burn. However, here the stream close to the west side has broken through, so that two streams run in parallel courses east and west, their flow controlled by the slight rise of the rough strip between.

#### **Carrot Burn to Braehead Burn:**

North of the Carrot Burn, NS 56484742, a hummocked rise sectioned diagonally by drains revealed, under 1.0 foot (0.4 m) of peat, a 30 feet (9.1 m) spread of small stones and cobbles in a granular reddish clay over tacky boulder clay. This, probably the last trace of Roman road in the area, directs the course towards the west shoulder of Loch Hill, where a footbridge, c. NS 56244770, may indicate the general line as followed by subsequent tracking.

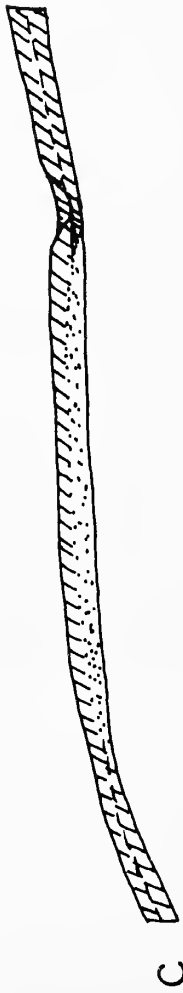
In all, six traverses were made over the area between High Overmuir and Loch Hill, with wide sweeps across the peat mosses to the west. These have established that it is improbable that the Roman road could have diverged far from the line recorded. Especially, north of the Carrot Burn, it must essentially cling to the watersheds between Loch Hill and Dunwan. Along this line a hollow way could be traced intermittently (1976), and the sites along the line are suggestive (Lonie and Newall 1976: 53-54).



a



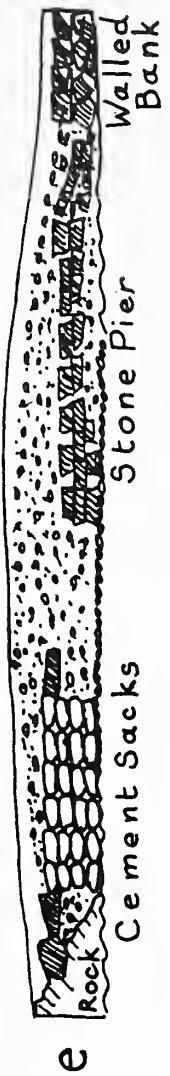
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c



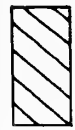
d



e



f



Peat



Peat and Clay



Barytes



Stone and Gravel



Reinforced Clay



Brushwood

**Figure 11****Section a.**

Myres South, NS 56574610.  
Stream.

**Section b.**

Myres South, NS 56584615.  
Drain.

**Section c.**

Myres North, NS 56554705.  
Terrace when dry.

**Section d.**

Myres North, NS 56554705.  
Terrace when wet.

**Section e.**

Overton Burn, NN 42257605.  
Stone and gravel road mound with  
successive secondary bridge piers inserted.

**Section f.**

Offerance, NN 53669621.  
Section of brashwood rafted road  
and later cobbled hollow way.

In 1982 these succumbed to deep forestry draining to such an extent that only stretches of boulder-walled croft foundations now survive. All turf-walled enclosures are almost impossible to detect. Sites lost include the following: the round rouse, NS 56504740, and the nearby hollow way and track; the croft north of the Carrot Burn, NS 56534748, where infield and enclosed pasture turf walls are obliterated and traces only of longhouse walling survive; the similar site on Loch Hill, NS 56354780; and the 'circular' polyangular enclosure N.N.W. of Loch Hill, NS 56054818. This, 90 feet 3 inches (27.2 m) by 89 feet 6 inches (25.7m), contained by a turf wall of short straight lengths, spread to 6.0 feet 9 inches (2.0 m), is perhaps best interpreted as a droving enclosure.

In 1976 a shepherd informed us that a drove road to Strathaven via Ballageich Hill passed just to the east of Langlee and by South Muirhouse. Mr. Gibb, then of Greenfield farm, said (1958) that the fank on the east shoulder of Ballageich Hill, used from 1938 as an artillery target, was reconstructed by his grandfather in 1870 from an earlier foundation, the sheep until then having been unfolded. The later tenant of Greenfield confirmed that a through 'road' ran traditionally over the mosses towards Myres, on the line of the road now to be described. This, the last length of probable Roman road in the area, runs from W.S.W. of Melowther Hill to Blackwood farm (ruin), and to Greenfield farm. It rises abruptly, NS 55354860, a mound 26 feet 3 inches (8.0 m) wide plunging W.N.W. towards the Dunwan Burn, where slight metal shows over gravel, and runs towards the east shoulder of Dunwan Hill, crowned with its early Iron Age fort.

#### Braehead Burn to Greenfield:

Kinking round the shoulder below the east annexe rampart, and partly overlaid by a turf dyke, it proceeds to the Braehead Burn, NS 54434923. There the section is of secondary road stones, separated by peat from very compact small metal in stiff brown clay. The road continues, cut through by rigs throughout its length, to pass under Blackwood farm boundary, NS 54324930, and to run under the farm buildings. To the north, ignoring the zig-zag approach road, it runs straight downhill, a 29 feet 6 inches (9.0 m) wide mound, to turn N.N.W. towards Greenfield farm. The final stretch is a sinuous low mound remetalled along the centre, but vestiges flanking it across the field suggest that it was formerly more strictly linear. In its course it is crossed by mediaeval and later boundaries (Welsh 1975: 45). The probable destination is Barochan Hill Roman fort.

No undoubted Roman traces have been detected north of Greenfield, but the following have been investigated:

(a) A mound c. 24 feet (7.3 m) wide round the east and north-east foot of Ballageich Hill, which turns to N.N.W. but fades. The 22 feet 6 inches (6.9 m) wide causeway across the marsh, between the north-west foot of the hill and the Lochcraig Burn south of South Moorfoot, was said to have been engineered by a local farmer in response to a challenge (Tom C. Welsh, personal communication, 1976). A traverse of the Earn Water has shown that the most feasible crossing point is close to the present Muirshields Bridge. Beyond it, the straight road from Muirshields farm is continued, by a right of way across the golf course, beyond the 1753 Mearns turnpike as far as the A77 road, NS 51655282.

(b) From the gateway north of the B764 road opposite Greenfield Cottage, a 21 feet (6.4 m) metalled road swerves from N.N.W. to N.W. to avoid a minor hillock, NS 54275055. Near it, close to the gate, a small pillar stone is inscribed FEUARS MARCH. The road is an apparent cart track c. 15 feet (4.5 m) wide running towards a ruined longhouse, NS 53915070, but close inspection shows that this follows a wider mound, at maximum 24 feet (7.3 m) across but cut by a ditch, along the west side of the superimposed track. South of the longhouse it is a faint green ribbon, emphasised by animal traffic, but although it aims at a gate north-west of the longhouse, it is overlaid by the west end of the building and by a yard annexed to its south wall. To the north the course is N.N.W. towards a ford on the Lochcraig Burn, NS 53875094, where the tight metalling beneath clay soil spreads up to 24 feet (7.3 m). Farther north, the road runs in with the remarkably wide farm road from East Moorhouse, which, south of a wooden bridge, degenerates suddenly to a much narrower terraced track. The earlier course is higher uphill round the spur between ford and bridge, a cambered way at least 18 feet (5.5 m) wide, with a hollow way following the uphill side. No continuation has been detected north of East Moorhouse, nor south of the B764 road, although a 20 feet (6.0 m) wide strip bounds Greenfield Cottage on the west. While this is patently an early road, it is not manifestly Roman over this short stretch (see *Nith Roads*, Part 2, forthcoming).

To the north, apart from short lengths of broad cambered mound on the north-east flank of the Fereneze Braes south of Paisley, and between the River Gryffe and Barochan Hill, each requiring further investigation, nothing has been recorded. It is possible, however, that the missing stretch was once known (see Appendix).

## ROUTE D.

## Barochan Hill Roman Fort to Dalginross Roman Fort

## A. BAROCHAN HILL TO DRUMQUHASSLE

## Longhaugh Point to Milton:

Flanking the east limit of 18th century woodland (Ainsley 1796) from the Longhaugh Lodge to Old Bishopton track, NS 43007255, an embanked road runs north, NS 43047300, to curve through the river dyke at Longhaugh Point and join a causeway, presumably built during the construction of the Long Dyke and Longhaugh Light. From the field to the east, a low mound coincides with the raised road where it cuts the dyke. Aligned crop marks (1974) suggested a continuation to the south, NS 43057300 to NS 43067215.

Over beach and mud-flat a 10 feet (3.05 m) wide paving of flat stones with central rib, tops a gravel mound 35 - 36 feet (10.7 - 11 m) across, aligned east of centre of Milton Island, NS 42537373. Here we recall the 16th century attempts to cut through the gravels of the Dumbuck Shoal (Deas 1876: 3).

## North of the Clyde:

North of the Clyde, a dissected vestige in rough pasture c. 34 feet (10.4 m) wide reaches a field gate east of the former L.M.S. railway bridge, NS 42407410. The course is along the east side of the road towards the former L.N.E.R railway bridge, whereafter, between a loop in the access road to the beach and the A82, a prominent cambered length passes under the latter, aimed at Dumbuck farmhouse. North of the farmhouse, a hollowed track ascends N.N.W. to a point west of a field gate below a circular water tank, NS 42257430, where it turns N.N.E. A 21 feet (6.4 m) terrace carries a cart track which ceases towards a gate uphill, NS 42507474. In rough ground beyond, the camber rises briefly, but much disturbed, across the east face of a quarry. Thereafter, shrubbery has forced a sinuous disalignment of later tracks, but the upper scarp of the 21 feet (6.4 m) terrace persists. Penetrating a woodland strip, NS 42407510, it traverses the west side of Loch Bowie, NS 42357535, where two runnels expose sandstone bottoming and possible kerbstones.

## Loch Bowie to Overton Burn:

South of a square water tank, NS 42407527, a layer of sandstone cobbles between flanking stones, 23 feet (7.0 m) overall, has a 5.0 inches (12.7 cm) capping of clay. The road runs north towards a high backed tree flanked mound which edges the west side of walled gardens at Barnhill, NS 42287540, but



the course is lost in trees. Beyond them, NS 42227565 to NS 42187596. a low rise crosses arable ground. As it approaches Overton Glen it is demarcated laterally by turf dykes limiting rigged fields. Directly ahead is a gorge, but a diagonal approach to the north-east leads to the one obvious crossing place, just above the high fall at the head of the gorge, NS 42257605, a common Roman practice since it affords effective local control of the passage. There, downstream of a recent bridge, a bank of stones and gravel 31 feet (9.5 m) wide rises from the north bank. Into the face of this mound have been inserted successive bridge piers, each only 10 feet (3.0 m) wide (Figure 11, section e), to replace an original ford.

The road fades, but the route is essentially north along the spur towards Garshake Reservoir, in the field south of which a clear straight crop mark, visible from the Lang Craigs, would, if projected, pass close to the north-west point of the dam, NS 42267621 to NS 42277645. Beyond this point a 21 - 24 feet (6.1 - 7.3 m) terraced mound runs N.N.E. towards Black Wood. An apparent drain at the east side develops uphill as a broad hollow way cut by cultivation rigs. This passes through to the other side, flanking and partly reducing the mound as they both enter Black Wood, NS 42607710. Within the north end of the wood the mound is recognisable, NS 42907745, inclined more westerly, and, clear of the wood, NS 43057753, then crosses a tributary of the Overton Burn, the steep descent of the banks by prolonged tongues of gravel in grey clay being typically Roman. A short distance upstream, heavy boulders support a buttress-walled hollow track, part of an estate road system (see below).

#### **Overton Burn to Little White Hill:**

To the north-east there is a confusion of criss-crossing tracks and hollow ways, and where the Roman road is visible it is cut by rigs. Some 250 metres from the stream the major hollow way runs off west, while at 360 metres a second hollow way cleaves the road. Slight hollows along the east side are possibly filled borrow pits.

Some 240 metres south of the main moor fence, the turf and stone walls of a rectangular enclosure cross the road mound, still mutilated by hollow way furcations. These soon move off north-east, leaving the distinct Roman agger clearly visible. Beyond the fence, NS 43547792, three quarry pits flank the west side. A partial section, c. NS 43707805, of a 21 feet (6.4 m) wide mound revealed, beneath 9.0 inches (22.9 cm) of peat, a 5.0 inches (12.6 cm) thickness of sandy grey clay bedded on a neatly kerbed base of sandstone cobbles.

The road now terraces the abrupt north-west edge of the hill spur, so that the peat moor behind might be bled by seepage or culvert beneath the road, as south of Loch Thom (Route system A).

#### White Hill to Gallangad Moore:

Over the west shoulder of Little White Hill, NS 43957828, the road is overlaid by an estate road, which edges off uphill to flank Meikle White Hill along an outcropping ridge, a well engineered heavily metalled road 33 feet (10 m) between block kerbs, provided with culverts and bridge piers of dressed blocks. Of former milestones, one dressed pillar survives with an incised numeral 3 on top. This road reaches the Gallangad Burn, NS 44707920, then degenerates on level ground to hard tracks.

Where this leaves the Roman road, a broad droving belt develops, forming a complex 54 feet (16.5 m) wide within which the Roman camber rises sporadically. The entire strip is expanded and mutilated by droving, "from Drymen to Lanark" according to one shepherd. Hollow ways follow the sides, occasionally converging to one or the other then dividing again. Occasional later tracks coincide. So the skein runs N.N.E. to ford the Black Burn, NS 44107868, whence it deflects slightly farther east across the plateau N.N.W. of Meikle White Hill. At the ford a further complication is presented, by a mineral way travelling obliquely across the line from lime kilns south of the Black Burn, NS 43957855, towards the upper crossing of the Gallangad Burn, NS 44707920.

From the north edge of Meikle White Hill plateau, NS 44307912, the Roman road edges north-east to cross the Gallangad Burn, NS 44657952, where it resumes its former course, sighted on the rise just west of Drumquhassle. The complex is readily traced to the second of the fords on the Gallangad Burn, NS 45008025, where in the south bank a rough course of cobbles in yellow clay is visible. Finally, before the main ford on the burn at the head of the gorge, NS 45428152, the Roman agger runs free, to be lost in the descent of the south bank, but the course is necessarily north-east upstream to clear the gorge, where a 24 feet (7.3 m) mound of brown clay over cobbles extends towards the stream. A north-west directed terrace clears the north bank to skirt the edge of woodland west of the Long Cairn, NS 45758145, and divert north-east towards Knockinhaglish.

#### Gallangad Moor to Dalnair:

Over Gallangad Moor traces are slight, but the low mound

is visible south of a ford on the Cameron Burn, NS 45908205, where yellow clay on cobbles is exposed. Thereafter the road sinks in wet marshland, but in several surveys was traced towards the centre of the wet plateau north of Tombocle Hill, NS 46808281, where the course is confused by hollow way and terracing due to the construction of turf-walled enclosures.

To the north-west, a conspicuous yellow vegetation band through wetland hinted at an old road line, but was not initially considered to be firm. Subsequent to the discovery, by the R.C.A.H.M.S. Air Survey, of the first century A.D. fort on Drumquhassle, this was examined in detail. From NS 46808281 the road was seen to deflect N.N.E. towards the Cameron Moor road, NS 47008318, beyond which the yellow blaze runs north, followed by a turf dyke, and east of a pylon, NS 47158365, then develops as a terrace across a spur. The vegetation band continues, gapping two turf dykes, NS 47208380 and NS 47258405, and is continued by a hollow way past the east side of mineral earthworks, to be crossed by a turf dyke and ditch. Again the yellow blaze is apparent to NS 47458430, where it rises as a hard terraced track traced to NS 47758455, aligned on the coach road ford south of Dalnair. It is possible that these indications betray the sunken Roman road, and a kink farther north-west would direct it towards Drumquhassle. No ford was located south of the fort, but a faint mound rising from the Endrick runs north to pass the fort on the west. This very fugitive length we have not mapped.

#### **Dalnair to Drumtian:**

Meanwhile, in surveys upstream of Dalnair, the following were recorded:

Downstream of the ford south of Drumtian farm is an earlier ford, reached from the south by a broad deep hollow way with traces of camber within and alongside, at NS 51718774. From this, a road mound crosses the field south of Drumtian, and terraces the fields to NS 52058804. The farmer could recall no road metal encountered during ploughing, but suggested a link with an ancient road at Camoquhill. From there an old road, followed centrally by a hedge line north-east of the farm, continued beyond, NS 53208991 to NS 53509022, as a hard raised track, then aligns with the right of way from the A875 to Upper Ballaird, an ancient but apparently post-Roman line. Further north-west of the A875, a broad hard ridge, slightly hollowed, was traced to NS 54509171. We were advised at Camoquhill farm that this was a drove line from the north to the Falkirk tryst. Further north, at Hoish, the farmer confirmed that the Callander to Falkirk 'drove' ran through woodland east of the farm towards the Drymen road. Towards

this, hard track and hollow way follow the north side of the Garrauld Burn.

South of the Drumtian ford, camber and hollow way pass the foot of Little Carbeth Hill, NS 51308725, while farther south at Drums (Drumore) farm, Mrs Allan confirmed that the drove road continued south through Drumore Wood south-east of the farm. In view of the apparent antiquity of the road round the north-east corner of the hill, and the appearance of three closely-spaced terraces enclosing the summit, the uppermost terrace on Little Carbeth was sectioned in late 1974, permission to excavate being willingly granted by Mr. Loudon Bishop of Little Drumquarron farm. We acknowledge the wholehearted efforts of the excavators, comprising Alastair Henderson, Neil Holt Lawrence Kepple, David Newall and George Newall. A section was taken some 60 metres east of the stone wall running north-south across the hill, and subsequently a second cut was made, a similar distance north of the hedge running east-west across the hill.

The north section revealed the possible vestiges of a clay bank fronted by a rough kerbing of large blocks. Probing traced these west as far as the stone wall. No ditch was found. Within the probable clay bank, a rim sherd of green glazed ware was discovered. In the east section, instead of the block kerb, large slabs fronted heavy cobbling over white clay, in the rear edge of which were two pointed stakes. A cut within the enclosed area confirmed Mr. Bishop's assertion that the top soil was only 4.0 - 5.0 inches (10-12 cm) thick. From the surface of lighter tight cobbling came six further sherds of 14th-15th century ware. In the absence of night soil debris these would appear to date the enclosure. It is therefore possible that the nearby access road was in use at this period. It should be stressed that the hill terraces are possibly geological, being matched by similar ledges round the hill to the north, only the top one on Little Carbeth having been adopted to carry a bank and a possible palisade or hedge.

#### B. DRUMQUHASSLE TO MALLING (Lake of Menteith)

South from Malling:

The first indication of a Roman road north of the Clyde was traced south from Malling Roman fort (Newall and Lonie 1973: 41). This work has now been extended to the south with Dr. T.M. Allan's assistance. From a short ridge south-east of Gartrenich, NN 55659825, a faint terrace runs north-east. In line, NN 55929850, at a stream crossing where stones in clay are exposed, a reduced camber 21 feet (6.4 m) wide, bounded along the north-west side by a 6.0 feet (1.83 m) hollow way,

traverses rough terrain towards the outer Gartrenich boundary, NN 55909857. Beyond the wall for c. 100 metres the hollow way is so direct as to be mistaken for a lade, but soon the tracks coincide, and the system is confused by realignments of these and of the hollow way. The course runs north-east to NN 56259892, where it runs N.N.E. to pass along the east side of a boundary wall. North-west of a turf and boulder walled enclosure, the hollow way has cut through to the east side, to be crossed by a metalled track from the enclosure, which runs along the road mound to a field gate, NN 56359940. Towards this shallow hollows flank the east side, and a stream sections a 27 feet (8.2 m) low mound of gravel. Beyond the gate all is levelled by cultivation, but the aim is N.N.W. towards a short trace of terrace, cutting the highest point in the field, NN 56359985, to clear the south-west corner of the south marching camp.

#### South of Gartrenich:

South of Gartrenich, further survey is hampered by afforestation and no conclusive through road has been determined. Several courses offer, as follows:

1) Dr. Allan indicated, as possibly in alignment with the road east of Gartrenich, a short stretch of track south-east of Baad, NN 53909645 to NN 53859642; a broad intermittently broken mound running towards Gartfarran Farm, NN 53359605 to NN 52859562; and the very wide farm road to Turner, NN 52359528 to NN 51759490. This route was examined between the Kelty Water and Turner and the following recorded.

Aligned with the track south-east of Baad and with a dip in the north bank of the Kelty Water, NN 53709630, a ridge followed by track and hollow way runs towards the A81 road, NN 53559613. A deep freshly-cut drain afforded a section (1983). This was trowelled, with permission of Mr. Robert Cumming of Offerance farm and formerly of Easterhill farm. Mr. Cumming knew of no tradition of this road nor of a crossing of the Kelty Water, but mentioned a ford on the River Forth at the deep bend, NN 55009704, whence access across the field to Easterhill reached the straight farm track to Baad, from which our road may have diverged near the bend at Hill Cottage, NN 54159670.

In section (Figure 11, section F) it was seen that the natural clay had been cleared of peat, and hollowed slightly to receive large kerb-like stones, possibly with additional clay bedding between and extending for a short distance on each side. Over this had been constructed a brushwood raft, 27 feet 11 inches (8.48 m) overall by 1.0 foot 2 inches (0.36 m) thick

at centre, secured by longitudinal logs supporting cross timbers. On this was built a cobbled road, 7.0 inches (18 cm) thick by 6.0 feet 9 inches (2.05 m) tapering to the east and possibly originally nearer 10 feet (3.05 m) wide, in view of its position on the raft. Peat 1.0 foot 2 inches (0.36 m) thick, under a few inches of humus, had formed over this surface. Through it ran a hollow way, of the narrow gauge similar to that recorded north of Gartrenich, 6.0 feet 3 inches (1.9 m). The bottoming was eventually the underlying road metal, which was subsequently reinforced by an additional 6.0 inches (15 cm) thickness of stones. It would appear that a purposefully engineered line was strictly followed, since a local deviation of some 45 metres to the north would have skirted the deeper peat.

At the stream to the east there were no traces of timber, but from the east bank a mounded rise, although apparently natural as is the long ridge towards East Gartfarran, suggested continuation. However, near to and parallel with the south-east side of the latter, a short stretch of faintly-cambered ridge runs from NN 53009610.

Across the roadside field south-west of East Gartfarran, a broad ridge is offset from the Turner road end, but in line with the straight stretch from NN 52249521 to the farmhouse. Alongside runs the hollow way, the one persistent thread. The farm road is 18 feet (5.5 m) wide between ditches, on the line of a right of way which is signposted south-west of the farm, but in this direction any original straight road would be barred by a high broad turf-walled enclosure, NN 51579481, effecting such an unnaturally abrupt deviation that we are obliged to consider it of later construction, i.e. the road is lost beneath it.

2) The obvious route north of Drumquhassle runs via Gateside and Blarnavaid . This was covered by Dr. Allan (1985: 10) who was prepared to accept the initial stage. To the north he suggests a road by Dalmary, Chapellarroch, north-east of Borland House, Gartmore House, Gartartan Castle, and west of Over Shannochhill by the 'Rob Roy Road', a very deep hollow way, north-east to c. NN 55010010, where it turns to run towards Malling.

Of the possible routes outlined above, in view of the stretch confirmed between Gartrenich and Malling, a route via Gateside and Blarnavaid, continued by a line via Turner, Gartfarran and Offerance is perhaps preferable, but requires further confirmation.

3) The A81 is traditionally 'a Roman road'. Granted the

early recognition of Bochastle as Roman, and the later drove routes to the south, it is not an unreasonable assumption. However, apart from a short length of terrace between Upper Ballat and Shandon Wood, nothing of interest was recorded along its line. Dr. Allan describes it as "a road which consists of a succession of straight stretches and whose continuation the A873 is, to beyond Thornhill, a ridgeway with a mostly commanding view of the Upper Forth Basin. Moreover its continuation, i.e. the long straight A84 to Stirling was described by the R.C.A.H.M.S. (Steer 1963: 115) as lying approximately on a probable Roman line (Tait, 1794: 274-278). The Commission assumed that the objective of such a road would have been Bochastle, on the ground that "Bochastle, unlike Fendoch, seems to have continued in occupation during the later Flavian period, when the Roman road-system in Scotland was taking shape". The possibility therefore arises that a Roman road on the general line of the A84 would, on reaching, say, the high ground a quarter of a mile north-west of Gartencaber (NN 692001), have sent off a branch to the Lake of Menteith, while itself continuing by Cardona (NN 689008) and Daldorne Wood to the Thornhill to Callander (B222) road at NN 645035.

#### North of Drumquhassle:

Because of the commanding view to Stirling and beyond from Callander Craig, we had considered a through road towards Stirling to be probable. Meanwhile (1975) we logged, north of Drumquhassle, on the presumed line of the Old Military Road to Drymen, a very broad cambered road which passed from beneath the A811, NN 49808922, past the farm of Lednabra to rejoin the A811 west of Balfunning Douglas, and to continue beyond it as a terrace, NN 51018960 to NN 51808990, towards Loaninghead. A possible continuation of this road is presently (1989) being investigated by Mr. and Mrs Ronald Page (1989: 10).

#### C. MALLING TO BOCHASTLE.

First surveyed in 1974-75 (Lonie, Newall and Sinclair 1976: 48-49), this length was reviewed in 1983 with Dr. T. M. Allan, whose observations (1983: 3; 1985: 10) are incorporated in the following report.

#### North of Malling:

North of Malling fort, where the road from Gallows Knowe bends north towards Malling House, an old road, now disused but mapped in 1854 (Ordnance Survey One-inch Tourist Map) as proceeding to Arntamie, runs along the west side of a field wall, towards a ford below the dam east of Malling House, NN

56250038 to NN 56430063. The present ridge is 30 feet (9.15 m) wide, but the wall runs along the shoulder of an earlier road mound c. 36 feet (10.97 m) wide.

In the paddock north of Arntamie, a ford across a minor stream leads to an agger which rises prominently from the south-east corner of the field beyond, NN 56600110, and, 28 feet (8.5 m) wide, runs N.N.W., to be intersected north of the field by a hollowed track to Mondowie (Mondouri). There the 20 feet (6.0 m) camber lies on a terrace 29 feet (8.8 m) across, but uphill all is levelled beneath the later Mondowie access road, NN 56700160, and thereafter only slight discrete traces pass to the east of enclosures. The agger rises, however, towards the wall junction at the north-west corner of the field, NN 56760185. Despite the faint traces, this stretch was confidently asserted to be "the old road to Arntamie", by the late Mr. McPherson of Nether Glenny.

#### Arntamie to Tombae:

At the field corner the road passes beyond, as the shelf which at this point supports a boulder-walled upper track, which runs along the foot of the crags from Mondowie. The course is now almost north, along the west side of a long field-wall to its junction, NN 56050243, with a stone wall crossing from the south-west. Along this length the wall runs along the east edge of a 24 feet (7.3 m) ridge, ditched on each side, but the road bed is at least 44 feet (13.4 m) wide and possibly originally as much as 50 feet (15.2 m).

The road now crosses the extreme north-west corner of the field, towards a rock shelf from which all traces have been erased, NN 56700345. The bared surface carries a large cup and ring marking, and a scutiform outline enclosing a small cup.

Beyond this shelf, the road mound, with secondary metal along its west side, is joined by a hollow way embanked along its east side. This develops from the field in the south to flank the east scarp of the road terrace. These elements clear the north-east tip of a south-west to north-east ridge, NN 56700264, via a 60 feet (18.29 m) cutting, from which the 36 feet (11 m) terrace continues north-east to the bank of the Glenny Burn, NN 56720275. The agger reaches a ford, NN 56730277, mounts the north bank north-easterly, deflects to N.N.W., and, at NN 56760300, with a further move towards north, reaches the west foot of Tombae, NN 56800312, as a faint terrace, soon obliterated by two turf-walled deeply-rigged fields. Clear of these, a much disrupted mound through heather turns N.N.E., at NN 56750310, to pass under the wide turf boundary dyke off the north-west shoulder of the wooded height



of Tombae. A short distance to the east, a gap in the later stone wall, NN 56950340, admits a track over the col between Tombae and the spur of Beinn Liath. This can be misleading if traced from the north.

#### **Tombae to Stonefield:**

The road is now a composite structure, heading persistently N.N.E. to NN 57300410. Since 1975 a dam has been constructed to the west, and the entire area scarred by forestry drains (1983). Along this stretch, the Roman road is followed by hollow way and later cobbled road, and is cut by peat extraction, by minor hill streams and by the forestry drains. For some distance the metalled road follows the upper side of the terrace, effecting a recutting of the scarp to present a stepped profile, but wanders off north-west to follow a natural terrace. Since this ledge continues south-west, it is extremely misleading if the road is being traced from the north.

In section, the Roman mound is of a type with the natural clay subsoil, but is liberally stiffened with small stones, especially on the surface. The agger is 24 feet (7.3 m) wide, beneath some 9.0 inches (22.9 cm) of peat into the surface of which has sunk the latest cobbled track, some 18 feet (5.5 m) wide (1983). Apart from the numerous confirmatory sections, the following profiles were recorded (1975): NN 57000350, Terrace 36 feet 6 inches (11.13 m), agger 20 feet (6.4 m); NN 57070363, terrace 54 feet (16.59 m), agger 24 feet (7.3 m); NN 57100370, terrace 36 feet 6 inches (11.13 m), agger 20 feet (6.4m).

Discontinuous traces of drain along the downhill side of the road, and some distance from it, although of a surface appearance, may indicate the presence of a marking-out ditch.

The road now tends E.N.E., NN 57300480 to NN 58010466. From the north end of the dam, the mapped track which flanks the Menteith Hills from near Stonefield now coincides with the Roman road, at NN 57550445. From this junction a new forestry road crosses, to run off more easterly uphill, sectioning the Roman road. Here it is of compacted metal in clay with light surface cobbles, and on the north side there is a short extension of unmetalled clay separated from the natural by iron(?) pan; this may indicate repair.

The complex is now a drove-like belt of Roman terrace, expanded by hollow way and modified by later tracks. The uphill Roman terrace scarp provides a linear corrective to the general impression of sinuosity presented by these later meandering features. Overall the belt is c. 60 feet (18-29 m). This broad

'terrace' can be seen to enter woodland, at NN 58700975, within which the shelf has been detected, NN 58300490, but not traced continuously.

#### Dullater to Bochastle:

In view of the terrain, the course is possibly close to the present road along the south-east limit of Loch Venachar. From beneath this road, north of Easter Dullater, NN 60110642, a low ridge crosses to a stream, NN 60130644, beyond which, across the third field south-east of Wester Gartchonzie, a broad mound runs north-east to degenerate, NN 60200650, to a hard track reaching for an upstanding natural ridge. Over the second field, traces of flattened terrace lead to a short length of camber at the south end of the first field, where traces fail. However, during the construction of an outbuilding north of Wester Gartchonzie, NN 60420682, the contractor commented upon the stiffness of a gravelled area. Immediately to the north, a turf dyke obscures traces, but soon passes south-east of a field wall. Thereafter a distinct road mound runs clear along the north west side of the wall which follows its south east shoulder. The midfield profile, NN 60520690, allowing for plough excision of the lower scarp and the extension beyond the wall, indicated a road c. 33 feet (10.06 m) wide.

From the north limit of the field, NN 60660704, a distinct break of slope across the next field is followed by a very low rise, clearly emphasised (1983) by sheet flooding dammed along the south-east side. This was traced to NN 60520713, where it is aligned on the A892 road. The possible crossing-point of the Eas Gobhain lies close to the island to the north.

From the south-east corner of the garden of Bochastle farmstead, a field boundary runs along a suggestive hard mound N.N.E. towards the railway embankment, and to the north continues as a stony ridge immediately east of the western boundary of the field, parallel to the west side of the fort. This, however, was examined, was shown to support a 12 feet (3.66 m) road and was rejected as post-Roman (Anderson 1956: 53-54). It might bear re-examination.

#### D. BOCHASTLE TO DALGINROSS

To the north-east of Bochastle fort an agger emerges from woodland to NN 62300895 (Newall and Lonie 1979: 43). Towards this point, Allan indicates a track bending uphill, NN 617084 - NN 619086 - NN 618087, and records the exposure, by forestry road cutting at, NN 62000875, of a compacted mound of cobbles, stones, pebbles and clay, 30 inches (0.77 m) high by 8.0 paces

wide, and a 6.0 paces wide agger between a dyke and the summit of the wood (Allan 1985: 10).

#### Druim Mor to Keltie Water:

From the wood, NN 62280893, a terrace runs north-east towards a kink in the southerly of two parallel streams. There all is eroded, probably due to river capture, which would account for the acute stream deflection and the atypical course involving a double 'crossing'. However, the terrace reasserts itself, 30 feet (9.15 m) wide with agger 19-24 feet (5.8 - 7.3 m), heading north-east to the south-west flank of a rise west of Druim Mor, NN 62500920 to NN 62930942, with attendant hollow way. As it crosses a marshy hollow, NN 62950944, confusion is caused by a raised track, fully 2.0 feet (0.61 m) higher, which appears to continue the course along the south face of Druim Mor. This, however, soon fades to a metal-surfaced near recent track, traceable to NN 63250968, where it becomes a hard track. The Roman agger, however, tends N.N.E. via a low col to gain level ground above the ridge, NN 63000955, where it sinks in marsh.

At the Allt na Criche a hollow way reaches a ford, NN 63501008, but upstream a more disturbed fording point, NN 63301010, carries a track which, among several shadowy traces, runs persistently back south-west towards the Roman agger. Slightly sunken, this track may indicate the Roman line, but is soon lost to the north-east of the ford in cultivated ground relative to primitive turf-walled foundations, NN 63451050.

#### Keltie Water to Water of Ruchill:

From a ford on the Keltie Water, NN 63781067, a blaze of yellow vegetation mounts to the west flank of Cnoc Mor, to be joined by an improved road from Thomasgreen (Chorrychrone). This yields on the north-west shoulder of the hill to a hollowed track which has cut through a stretch of higher wider road, NN 64151097. Round the north end of Cnoc Mor, in marshy ground, is a complex of roads, from which a hard track with accompanying hollow way crosses, to pass back down the east and south sides of the hill towards the Keltie ford, clearly an ancient crossing place. East of the hill peak, however, the original terraced mound is recognised, at NN 64701115, 24 feet (7.3 m) wide, running to the end of Druim Meadhoin, NN 66401290.

Between Cnoc Mor and the Druim, the terrace is 24 feet (7.3 m) wide. For some distance, near-surface metalling c. 12 feet (3.66 m) wide overlies the uphill edge of the road, and the original slipped terrace scarp has been recut to present

## Figure 12

## Maps BN1, BN2 and BN3

The Roman road north of Loudoun Hill from the  
Tongue Burn to Greenfield.

## Maps D1 to D4

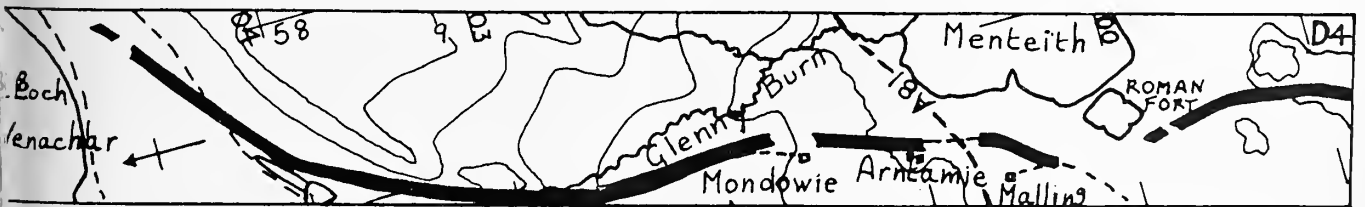
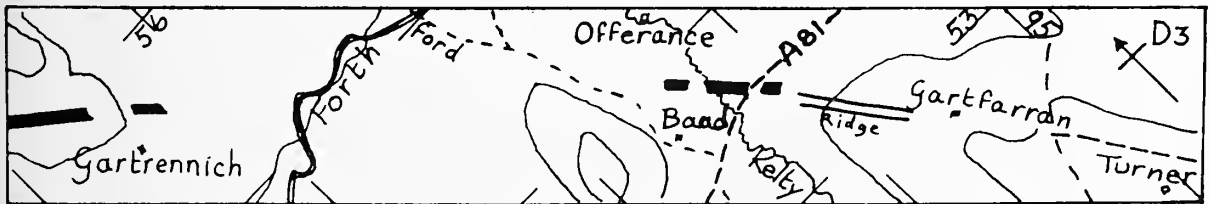
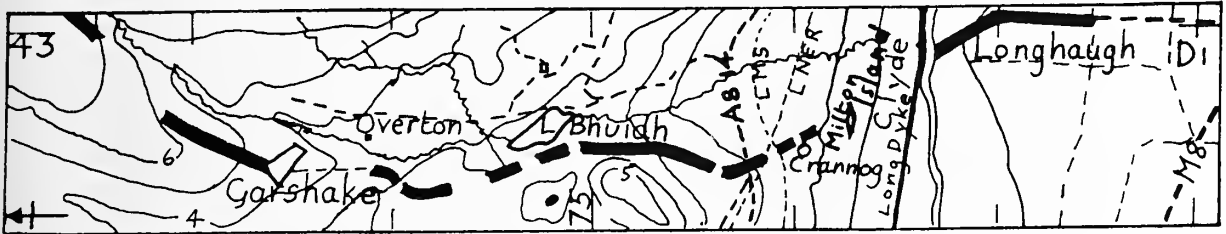
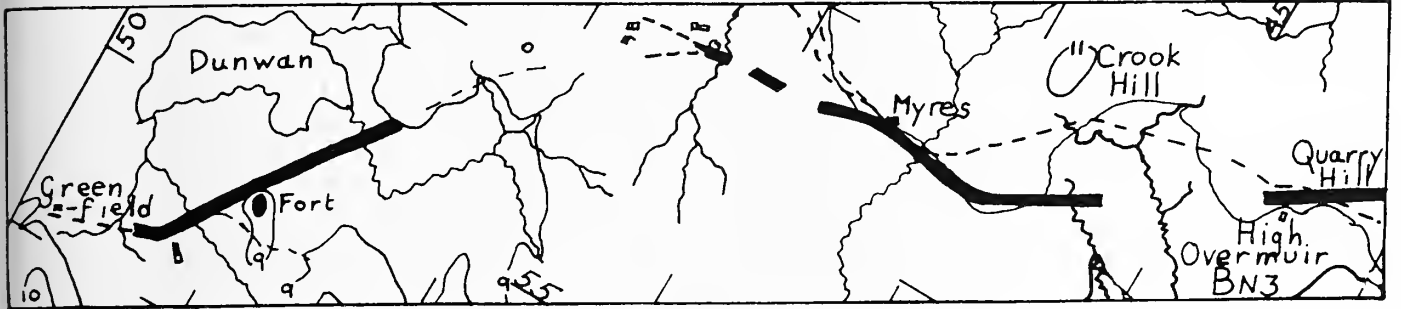
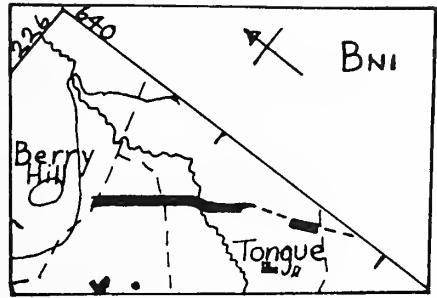
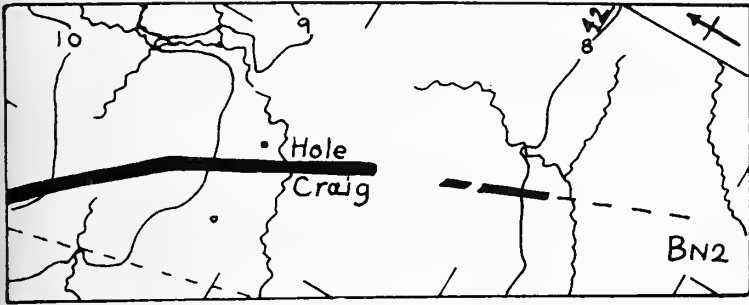
The Highland Boundary Fault road.

## D1 - D2

From the Clyde to Gallangad Moor.

## D3 - D4

Road length near Offerance, and, north of the River  
Forth, the Roman road to Malling Roman fort and  
beyond towards Bochastle.



the familiar stepped profile indicative of re-use. These secondary features cease, when towards Druim Meadhoin, from NN 65201160, the road presents a sunk profile, where the engineers, as also farther north-east, had channelled the peat to take the 24 feet (7.3 m) wide road bed.

Along the south flank of the ridge the road is again terraced, occasionally expanding to 27 feet (8.2 m). At the north end of the Druim, NN 66441290, having by then attracted a hollow way from the direction of Leathan Dhail, it switches slightly south to surmount a local rise, NN 66601305, an obvious sighting point, before resuming its purposeful north-east course, descending to the marshy peat-clad approach to the Allt à Challtuinn, again presenting the sunken profile. So it runs with hollow way alongside, but nearing the stream it fades due to regenerative peat growth.

#### Water of Ruchill to Auchinner:

To the south, in the angle between the river and the Water of Ruchill, as seen from Tom Odhar to the north-west, yellow vegetation appears to outline a cordate enclosure, with adjacent rectangular outline on the north, enclosing c. 0.5 hectares. The situation intermediate to Bochastle and Dalginross is very suggestive, but close inspection in deeply dissected peat, despite the hint of linear hollows across the north-west face, was disappointing.

Beyond the stream the road channel is soon detected, and runs to an unnamed stream, which has deeply eroded its valley to carry alternative beds. Here the road is a miniature hanging valley, some 20 feet (6.0 m) or more above the streams. On the opposite bank, NN 67501393, a compact stone mound spilling downslope, the possible hanging remnant of a bridge pier, leads straight into the continuation of the road cutting. The indications in the valley bottom are of a river originally passing along the north side, but occasionally undercutting the south bank, totally eroding it as the flood plain expanded.

The sunken way is now traceable to NN 67761413, where the peat plateau is eroded in a sheer face, which exposes the 24 feet (7.3 m) wide cutting, tightly packed at bottom with branches and brushwood to carry the gravelly clay road. To the immediate south-west the plateau projects towards the Allt an Dubh Choireinn. Along the north face of this projection the road is ramped E.N.E. to the valley bottom, partly recessed into the edge of the plateau, and partly built on a buttressing extension, as above Ravenshaw (Route system A) and south of the March Burn Gorge (Route C west). Over a gravelled base, a thick packing of gravelly earth and clay gives place, towards the

foot of the ramp, to a layer of heavy cobbles which causeways towards an extremely wide ford, NN 17821415. North of the river this is approached by a mound, reduced to 21 feet (6.4 m) by a broad hollow way. The extreme extension of the ford upstream of this point, despite later use, might have been employed to reduce the force of the stream.

To the north-east the road admits passage between rigged plots, but is dissected by one parcel of rigs, and, mutilated by the hollow way and reduced by later through traffic, is difficult to follow. Clear of the fields, on the west shoulder of the Monadh Odhar the camber follows a 32 feet (9.8 m) terrace, hollowed centrally by later use and along the south-west edge by the hollow way. Here a drain cutting sectioned a 24 feet (7.3 m) clay road with a 5.0 feet (1.5 m) extension to the south (Figure 4, section C). To the north-east it is crossed by the most recent road, NN 68101455, but about 100 m further on, aimed at the south-east side of Glenartney Lodge, it is lost under peat. However, a length of kerbed road, post-Roman but possibly based on an earlier approach, heads for a gate south of the Lodge. The alignment suggested that the primary road should lead to a ford on the Allt Strath à Ghlinne, above the known ford at Auchinner. This was duly located, but before proceeding into Glen Artney it may be of interest to review the parcel of roads between the Keltie Water and the Allt Strath à Ghlinne.

#### **Keltie Water to Allt Strath à Ghlinne:**

In the seven wide-ranging surveys required to establish the priority and continuity of the Roman road, all other through roads were of necessity examined, although it was not possible to trace each continuously, or to trace their individual historical developments. Along the roads numerous sites were recorded (Newall and Lönie 1979: 43). Many of these, being round or oval 'turf' huts, would fall under the general heading of 'shieling'. Others of historical relevance are discussed below.

In all, four main threads can be traced along the through valley, as undernoted:

- (1) The Roman Road. Apart from the forts, no obviously related structures were detected along its length, the few proximate sites being of later date; nor did it overlie any earlier track.
- (2) Hollow Ways. The main artery which follows the Roman road, sending off branches, is paralleled by similar ways along the north flanks of the valleys. These are probably mediaeval.

(3) The major metalled road which preceded the 18th century 'coach' road (Stobie 1783), and branched to communicate with several primitive upland settlements.

(4) The 18th century road, and later modifications.

As the hollow ways are mentioned en passant, we may turn to road (3). Immediately downstream of the major ford on the Allt an Dubh Choireinn are the ruins of a bridge, with thrust shoulders keyed into the pudding stone banks, and with the stream bed excavated to receive the piers. Overall 16 feet (4.87 m) wide, the passage way is reduced to 12 feet (3.66 m) by low, 2.0 feet (0.61 m) wide, parapets. To the north-east the road follows the south flank of the Monadh Odhar, well metalled and 18 feet (5.43 m) wide on a 21 feet (6.4 m) terrace. Beside it, NN 67871420, is a roughly-built turf and boulder house foundation, 23 feet (7 m) by 12 feet (3.66 m) overall, with rounded west end and 2.0 feet (0.61 m) thick walls. At NN 68751490 this road is overlaid by road (4), but, at NN 68901511, a possible earlier phase passes to the north of (4), a hard track 34 feet (10.34 m) wide between banks, and with hollow way along the centre and down the side now acting as a drain. This runs to the common road junction, NN 69301540.

To the south-west it passes to the north of the Roman road, towards the north side of Druim Meadhoin. Along the north-west flank of this ridge, from c. NN 66001266, a 12-18 feet (3.66-5.43 m) cobbled road was traced to NN 64301120. To the south-west it is probably the earlier metalled road to Corrychrone, round the north-west side of Cnoc Mor. At NN 65501230 it passes the north side of a clachan of eight small rectangular and subrectangular stone houses, of earlier appearance than the usual 18th century long houses. Here the road widens to a broad track of hard metal over gravel, occasionally cambered, and extending to 24 feet (7.3 m) and 30 feet (9.15 m) over two streams just west of the settlement, but drains within a few metres reveal no substantial traces. Farther south-west, it clears the south end of a turf-outlined long house, NN 64611154, 27 feet (8.3 m) by 12 feet (3.66 m) within walls up to 4.0 feet (1.22 m) thick, and with a 6.0 feet (1.83 m) wide semicircular annexe on the north. Facing this across a minor stream, there is a circular foundation, 8.0 feet (2.44 m) within a full 18 feet (5.5 m) diameter, and apparently double-walled. With this long house, two others may be compared: (a) NN 64100881, turf-outlined with three compartments, and 33 feet (10 m) by 23 feet (7 m) overall; and (b) west of the Keltie Water, NN 63311020, a similar build but of two rooms, largely of stone and round-ended, but with a third chamber of turf-outline attached, and 34 feet (10.5 m) by



4.0 feet 9 inches (4.5 m). These may be late mediaeval to 17th century builds. A similar outline on Walls Hill, Renfrewshire, was dated to the 14th century (Newall 1960: 14-15).

West of the clachan of eight houses, the road divides, a lesser track, at maximum 15 feet (4.58 m) wide, reaching for other uphill sites, one a turf and boulder walled long house, 28 feet (8.5 m) by 16 feet (4.8 m) over 4.0 feet (1.22 m) walls, at NN 64541120.

Road (4). The 18th century road formerly crossed the Allt an Dubh Choireinn by a bridge of megalithic proportions, spanning the gorge some 550 metres upstream from the first bridge. Subsequent to the collapse of this bridge, a temporary road looped downstream to the Roman ford until a third span was built above the second.

#### **Keltie Clachan:**

Between this river and the Keltie Water, south of road (4), there are at least five round or oval turf huts, and occasional lengths of track may be contemporary with (3). At the Keltie Water the 'coach' road ran initially in well-graded approaches to a major ford. This was subsequently replaced by a bridge, rebuilt at least once and possible twice, up-river. Two minor fords lie downstream. One track leads E.N.E., south of the Allt à Bhacain. To the north, south of the initial straight coach road, preceding the wide loop towards Airidhvuriardich, a firm road, with massive bridge piers at a minor stream, carries a 12 feet (3.66 m) strip of cobbles. This probably served a former house cum enclosure associated with rigs.

It can be seen that the primacy of the Roman road, as is commonly the case, was acknowledged throughout the Middle Ages and into the 17th-18th centuries. Only then was the main artery over the uplands west of Glen Artney transferred to the north side of the through valley.

#### **Into Glen Artney**

East of the Allt Strath à Ghlinne the same sequence of roads may be discerned, with (a) branches from roads (2) and (3) running higher uphill to turf and boulder houses and later 17th-18th century settlements; and (b) nearer the main river, a four-tier superimposition of Roman road, major hollow way, possible 17th century metalled road, and final 18th century surface with later deviations. Here again, the Roman road pioneered the course along the north bank of the Water of Ruchill, only the latest metalled surfaces being present to the south.

(a) From the ford, NN 69231590, a track with proximate traces of hollow way, presumably relative to Systems 2 and 3, runs uphill. With it are associated turf long houses. One, NN 696163, two roomed and 36 feet (11 m) by 18 feet (5.5 m), lies north of an enigmatic structure cresting a ridge. There parallel turf walls c. 120 feet (36.6 m) long, enclose a suite of at least five rectangular 'hut' bases. At NN 699165 a long house, 29 feet (8.8 m) long, is partly overlaid by one of three small stone-lined round 'huts', while, at NN 704168, a trapezoidal turf house, with adjacent turf-walled enclosures, lies downhill of a later township of four long stone houses with corn-bin and kiln. From this a well-defined hollow way connects with the Roman-based complex to the south.

Further east, below the junction of the Allt Coire Choire and the Allt Glas, NN 71651740, just north of a 19th century clachan with traces of two successively earlier groups near by, the hollow way fords the stream. To the east, the upland track, terraced and up to 16 feet (4.8 m) wide, passes to the north of Meall na Gaisge, crowned with its chapel-like enclosure and surrounded by rigged fields. From this upland track, hollow ways and later tracks connect with the parcel of roads to the south.

#### The Roman Road through Glen Artney

From the upper Auchinner ford, NN 69231590, within a broad swathe of paths and sheep-tracks, two almost obliterated main tracks may be detected, and towards the mapped road, NN 69981605, traces of camber may be discerned. From there to the fence west of Dalclathick Lodge, NN 71451702, runs a band of superimposed roads, occasionally in excess of 60 feet (18.3 m) wide, and broken through in places by long use into several well worn-down tracks. Four major roads may be identified. A - the Roman road; B - a major hollow way into which run the hollow ways from the upland sites; C - a well-metalled road; D - a higher metalled road as mapped (Ordnance Survey 1:25000 Sheet NN 61/71).

Along this length, while the several surfaces may be detected in the deeply rutted and eroded area to the east, there are three clear pointers to the sequence.

(1) As the stone field-wall follows the south edge of the latest road it passes to the north, then to the south of the Roman line before again turning to the north, NN 70201616 to NN 70401630 to NN 70601642, beyond which point the Roman shoulder lies to the south, gradually passing under the later roads.

(2) At a stream crossing, NN 70541630, the more westerly

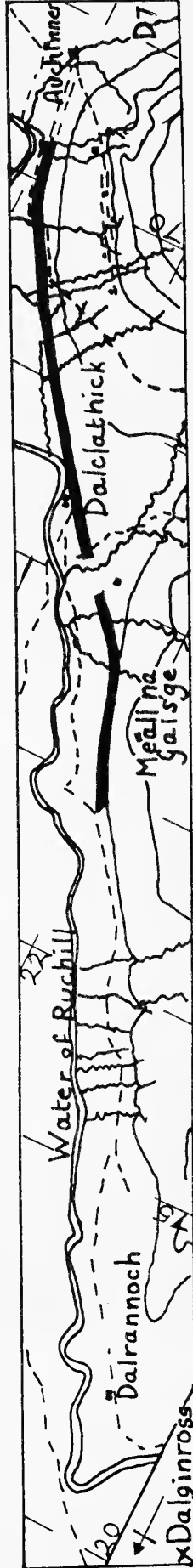
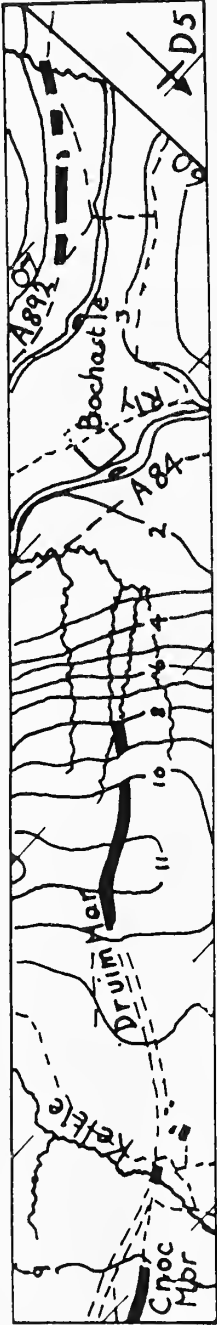
of two tributaries, the latest 18 feet (5.5 m) wide road diverts to avoid a ruined bridge of the earlier 16 feet (4.8 m) metalled road. In doing so it crosses over a hollow way running to coincide with the north edge of an underlying road. The shoulder of this, the Roman road, here lies clear to the south with cobbled footings, the possible remnants of a culvert approach.

(3) Along the edge of the wide loop of the Water of Ruchill north-west of Dalchruin, NN 71501696, erosion gullies have exposed the clay and cobbles of the primary road, with, about one metre to the north, the superimposed kerb of the lower metalled road, the latest surface lying a similar distance farther from the second. Along the north side runs the major hollow way. Where the full width could be established the Roman terrace was 30 - 32 feet (9.15 - 9.75 m) wide.

West of Dalclathick Lodge the roads diverge. Initial difficulty in detection was overcome when, from the opposite bank of the river, the vestigial shoulder of the Roman road was clearly pencilled in shadow in low sunlight. The road edges the field, NN 71501705 to NN 71701718, a faint terrace almost erased by cultivation. To the north-east it is likewise vestigial in rushy ground, but is more readily traced towards the Allt Glas, from the west bank of which an obvious causeway runs to the river, NN 71907135, upstream of ruined bridge piers.

On the east bank a much-slipped disrupted mound ascends, to be lost in a turf-dyked field, but a lower turf dyke along the river bank turns abruptly uphill to mount adjacent to and parallel with the broken agger. Beyond the field there are no obvious traces, but a minor stream, NN 72101755, exhibits a possible riser mound on its east bank. A corresponding tongue may have been eroded from the now abrupt west bank. Downstream is a well-worn crossing taken by hollow way and track, the forerunner of the latest track along the river bank, the faint terrace of which proves misleading at several points. While it is possible to suggest that the Roman road may have taken the lower crossing, the abrupt local deviation involved is out of character, and the more improbable in that, on the initial E.N.E. alignment, the full 30 feet (9.15 m) terrace is located farther beyond the upper possible crossing point. As it assumes a slightly farther E.N.E. course, a minor streamlet issues from a possible culvert, and at the next stream, NN 72401775, the remains of firmly-bedded cobbled ramps are patent.

Over the next field, the terrace is readily traced to the turf bank limiting rigged ground south of Meall na Gaisge, where a later track from the west side of the Meall joins it,



## Figure 13

## Maps D5 and D6

The Roman road approaching Bochastle Roman fort, and further on, the skein of roads traversing Druim Meadhoin, the Monadh Odhar, and Glen Artney.

## Map D7

The Roman road from Auchinner to Dalginross.

at NN 72681780. Here the road is abruptly reduced to 12 feet (3.66 m), but to the east, as it enters woodland, it has expanded to a full cambered width of 24 feet (7.3 m), rutted by track and hollow way. Just within the wood it is reduced to less than 12 feet (3.66 m) by a stream which has probably developed from a culvert, NN 72951790. Beyond this the mutilated road, again at full width, was traced through woodland as far as NN 73151795, where it was left committed to Dalginross.

At this stage in our research, circumstances imposed a two year gap, after which we returned south to further inspect Route B north and Route C west, which had been left east of the Doon. However, before we left we considered the probable line from the south bank of the Water of Ruchill and from the site of Dalginross fort. We concluded that the Roman road must run close to the modern track south of Blairmore, and flanking Dalrannoch Hill, possibly above the mapped road, descend to the river below Dalrannoch (Allan 1985: 51). Unfortunately the river ran high, and we were unable to test the possibility of a ford or reduced bridge piers surviving at Dalginross.

Our final act was to visit the signal station above Fendoch, to examine closely its ambit of communication.

#### Into Glen Artney?

In 1936 Richmond and McIntyre, having suggested a main Roman road between Fendoch and Dealgin Ross with a link with Strageath, continued "But there is also a causeway leading out of the fort [Dalginross] south-westwards, up Glenartney; and Sir George Macdonald has discovered an anonymous plan of the site, made when the remains were less indistinct than now, which shows this as a prominent roadway, metalled and kerbed. The route up the glen and over the hills to Callander is not now organised as a motor road; but it is a traditional pass, marked on Stobie's map of Perthshire. It is no worse, if as bad, as the principal Roman lines of penetration through the Lake District further south. Are we then to recognise, in the new fort at Fendoch and the half-forgotten traces of a road-system connecting it and Dealgin Ross with the south and south-west, a complement to the main line of penetration by Ardoch and Strageath? It is at least a logical complement. Fendoch and Dealgin Ross both do what no fort further south can effect: they block up the Highland gates, and prevent all access to the southern plains" (Richmond and McIntyre 1936: 406).

By the time the full report on Fendoch was published, Richmond and McIntyre had second thoughts about a built road:

"It is not known that the Romans provided this route, controlling the very fringe of the Highlands, with a metalled road, .... But it is certain that the route was recognised and employed as a natural passage" (Richmond and McIntyre 1939: 111). Later, it was said of Fendoch: "No road of permanent construction had yet reached the fort before it was systematically dismantled after a short occupation" (Ogilvie and Richmond 1970: 69).

The anonymous plan referred to above is dated 1786 and shows a road issuing from the south gate of Dalginross fort (Macdonald 1939: 252-254).

Crawford mentions this causeway, seen from the air in 1939 or earlier, "running for some 800 feet from the south gate towards the Ruchell escarpment", from which a presumed road west could have passed through Glen Artney "over a wild moorland region, where some traces of it should survive. Such traces should plainly be seen from the air; and it was with the purpose of looking for them that we flew up Glen Artney in 1939. The visibility was perfect and for once I feel confident in stating that there never was such a road" (Crawford 1949: 43).

In view of the veritable cable of roads through Glen Artney, including four main arteries each of which had to be examined on the ground to disentangle the primary thread, this is indeed categorical.

Since then, despite St. Joseph's suggestion of a link between Malling and Bochastle (St. Joseph 1969: 109), the general opinion stated or implied has been that the 'glen-blocking' forts either stood alone or were reached by branches from 'the main road' via Ardoch (St. Joseph 1976: 25; Breeze 1980: 17; Frere 1980: 91; Hanson 1987: 149, 152).

In fact, we have demonstrated that the 'glen-blocking' forts were supplied with a through road; in short, that they are elements in what may be termed the Highland Boundary Fault *limes*.

### The Highland Boundary Fault Frontier

The frontier which was to be Rome's ultimate boundary in Britain was doubtless conceived in the light of normal Roman policy of separation and control. Initially it would contain the tribes freshly overcome - *praesidiis castellisque circumdatae* - and thereafter would act as an economico-political control along the corridor of tribal contact, able to regulate all movement, whether of commerce, migration, flight, or hostile incursion. To this end it is of

little matter whether it lay in British or Caledonian territory (see Hind 1983); certainly it lay close to the tribal frontier. In the event of further advance, it would remain to control tribal intercourse and to police areas of potential friction. Meanwhile, by its presence it would influence the peoples beyond; it cut across any normal civil routes of barter or transhumance via the glens. Such a control was exercised in North Africa (Baradez 1952: 19).

In the case of the Fosse Way, the first frontier in Britain, while the Belgic and Gallicised tribes were enclosed, the Dumnonii were excluded, almost certainly on cultural and linguistic grounds, the bases for Caesar's tripartite division of Gaul, rather than mere topography. The Fosse Way, nevertheless, with its advanced legionary forts, did exert influence on the tribes beyond, as is evidenced by later events in Brigantia, even if they were "left to their own devices" (Cunliffe 1988: 158).

In the case of the Caledonians, there were cultural, linguistic, and even genetic differences which distinguished them from the lowland Britons. Clearly a *limes* was appropriate; topography rendered it advisable, even inevitable. This accepted, it then follows that the Highland Boundary Fault *limes* was primary, and was initiated during the advance to the Tay. On this premise rested our argument for a road to link the 'glen-blocking' forts (Newall 1975: 82-83). At the same time we argued for an Eastern Command advancing via Camelon, Ardoch and Strageath on Bertha, or a cohort fort nearer the later Inchtuthil. That this was the case is rendered probable by the recovery from Camelon of terra nigra in some quantity and sherds of Lyon-ware beakers, which led the excavator to argue for a "date as early in the Flavian period as the historical context will permit" (Maxfield 1980: 77).

Whether campaigning ceased on Titus's orders or on Agricola's suggestion (Hanson 1987: 107-108), it would be necessary to overrun the Britons as soon as possible. In the event, the valour of the army - *virtus exercitus* - in the face of the weather rather than of the enemy, carried it to the Tay. As there was time, forts were built and so furnished that there would be no retreat (Ogilvie and Richmond 1970: Agricola 22).

Therefore the final frontier, despite the convenient space between the Clyde and Forth estuaries and the troops encamped there in force (Agricola 23), was not "*in Britannia ipsa*" but took the form of a salient - *sinus* - driven into Caledonia. The outer *limes* would require to extend at least as far as Bochastle to contain the Britons, who held territory almost as far north as Crianlarich, granted that Clach nam Breatann (the



Stone of the Britons) in Glen Falloch is indeed a boundary marker (Lacaille 1929: 327, 329-331; Rennie 1991).

There was, however, no time to invest Fife; into this the enemy had been driven "as into another island", and there they were to remain for another two years. To this interval we would refer the chain of watch towers along the inner arm of the salient, for a close guard would be necessary on the contained and recently routed foe, especially as they might be reinforced by sea.

One year was employed in completing the garrison and communications cover of the conquered territory, probably with speed by the use of forced labour (Agricola 31 - *corpora ipsa ac manus silvis ac paludibus emuniendis inter verba ac contumelias conteruntur*). A further year saw exploratory campaigning, possibly in Argyll (Agricola 24).

In the sixth year of his command, Agricola enveloped the tribes north of the Forth. Granted the Tay salient, logically only Fife has to be considered, a view reinforced by the description of the campaign. Cut off by the Camelon-Ardoch-Strageath arm, and attacked on all sides from land and sea, Fife was truly overwhelmed (*amplexus*); doubtless Agricola was in a hurry, for it was the movement of "the peoples beyond" which caused him anxiety, not without reason.

It may have been at this time that the camps at Dunning and Abernethy were built by redeployed forces (Hanson 1987: 127).

While the war was being waged against Britons in Fife, the Caledonians were massing, and even attacked some of the frontier forts. Eventually Roman arms prevailed and the cry was "Further into Caledonia". Until now the sixth campaign had probably been conducted close to the Tay frontier. Hence it is likely that Mons Graupius lies farther south than has hitherto been imagined (Hanson 1987: 330).

Now the short-lived watch towers could be dismantled. The timbers, still fresh, could be re-used since there was no suggestion of withdrawal from the area. We cannot reasonably argue for a later tenure. With the Highland Fault *limes* in existence they were not required once Fife had been conquered; without the outer *limes* they could have no function, since neither Fife nor Caledonia was friendly. A protectorate seems improbable, nor do Roman finds from Fife suggest otherwise.

With these towers we may now compare the small look-out post above Fendoch. Being static, it is less effective than would have been a daily patrol of the Sma' Glen, and it is also

blind to the upper glen; a further signal post would be required in that direction. Likewise its lateral range is limited, nor should it have stood alone if such cover was its purpose. Despite search of commanding heights along the route we failed to locate any such posts, which, on the Fendoch state of preservation, should have been recognisable. The Fendoch signal post is highly sited. We believe that such stations, e.g. Eilden Hill North and Hillside Hill, were long-distance early-warning posts for relaying information intended to co-ordinate movement between different commands. Hillside Hill, though of a later period, was doubtless intended to receive signals from the Firth of Clyde and beyond (Newall 1976: 111).

Strageath is the obvious nearest point on the inner line of advance, no longer a frontier but a local *limes* between Briton and Caledonian, exercising inter-tribal control. The Caledonian attack would have stressed the advisability of contact between the two lines. The corollary is an intercommunicating road or roads. A Strageath link with a main road between Fendoch and Dalginross was formerly considered (Richmond and McIntyre 1936: 405), and we should expect a link with Bochastle via Doune.

Finally, on the advance north, we should expect the Highland Boundaries Fault *limes* to extend to a major terminal near the mouth of the Dee, which is the end of the natural transhumance-barter corridor. Inverquharity would be one element in this extension. Perhaps like Inchtuthil, it was never completed.

#### Appendix: Evidence from Mediaeval Charters

When a western Roman route was envisaged, we suggested that intermediate forts should lie north and south of Barochan (Newall 1975: 87). That to the south has not yet surfaced, nor has the road been traced which might lead to it from north of Ballageich.

In such case we have recourse to Mediaeval charters, in the hope that a road proximate to our projected line might find reference; for while we cannot claim a Roman origin for all early Mediaeval roads, we may argue for a continuing if intermittent maintenance leading from time to time to realignment. Apart from the roads in Glen Artney, we find that east of Gatehouse of Fleet three roads follow the Roman line, with a fourth to the south. To the west, the Corse of Slakes road exhibits at least three phases, while an independent causeway lies to the north. Indeed there are specific charter references to road repairs in the Middle Ages. This we will consider in our treatment of the Nith Valley routes (to

follow). For the present, we consider only charters of the Royal burgh of Ayr and of Paisley Abbey.

The 1202-07 Charter of the Royal Burgh of Ayr states "*ut apud Mach et Karnebuth et Lowdun et Crosneton et Lachtalpin tollium et alii consuetudines que burgo debentur dentur et recipiantur*". It has been said that these toll points at Mach (the Maich Water), Karnebuth (unlocated), Lowdun (Loudoun Hill), Crosneton (Corsencon), and Lachtalpin must lie on Roman roads (Reid 1960: 133). Loudoun certainly lay near a Roman road, Corsencon may well lie near one, but Lachtalpin, relative to Ayr is more likely to lie in the vicinity of Laicht Alpin castle, NS 450089, near Dalmellington (Lonie and Newall 1974: 27), than on the Wigtownshire border (*contra* Reid 1960: 134). Galloway was tribal and not feudalised until after the subjection by Alexander the second in 1230. The toll may well have lain on the old Ayr-Dalmellington road, clearly non-Roman, although a Roman origin is locally possible.

Mach is almost certainly the Maich Burn between Renfrewshire and Ayrshire. It is referred to in a charter of Walter the second, son of Alan, of 1208-18 (*Reg. Mon. Pas.*, 17: folio lx. - Maitland Club 1832) granting to Paisley Abbey the land between the Maich and the Calder, while a 1386 charter of John, Comes de Carric, refers to "*aquam de Maach inter baronias de Cunnyngham et de Renfrew*" (Metcalf 1905: App. 439). Tolls were exacted there by the hereditary Sheriff of Renfrew, but there is no mention of a road on the Renfrew side of the border.

However, in a charter of 1294 (*Reg. Mon. Pas.*, 94: folio liv. - Maitland Club 1832) the monks of Paisley Abbey were granted the right "*eundo et redeundo per vias de Arlaw, Conwarren, le Rass, et de Stokbryg et semitas husbandorum assuetas*". It should be noted, even emphasised, that the last were recognised tracks; there was no licence to roam at large.

In Arlaw we may recognise Harelaw, while the definite article preceding Rass would suggest Stuart's Rais, NS 57055940, now erased, sited on the old Paisley to Barrhead road. It is tempting, then, in Arlaw to recognise the road from Caldwell Law, which enters the parish at NS 46535930, runs to NS 46765980, then turns from N.N.E. to north-east to pass east of Braehead. Thereafter it descends the Gleniffer Braes in a series of zig-zags, crosses the 'Harelaw' bridge and proceeds via the B775 branch at Brodie Park as Causewayside Street to

Paisley Cross. That this northern length had another title is suggested by the grant, of 5th February 1503, of the tenement of Blackhoill, "*habens antiori parti publica via regia*". This is to be equated with the Blackhole of 1872, then equivalent to 113-116 Causeyside Street (Semple 1872: 69-70).

Near Caldwell Law the road is grass-grown, metalled, clearly raised, and at maximum 20 feet (6.0 m) wide. From beneath its edge, and under a stiff compacted lower gravel layer, NS 43125611, Mr. Ian W. Grant of Caldwell Law recovered from the edge of a runnel, at depth 1.0 foot 6 inches (0.46 m), the strap handle and body sherd of a green-glazed blue-grey ware jug, dated at Tullie House to the 14th/15th centuries (Newall 1956: 21).

Subsequently, in clearing the head of the runnel, Mr. Grant unearthed six further sherds of similar ware, one decorated with studs, and a knife-cut black shale whorl (Crawford 1966: 39). More recently (1988) the field round a reputed Mediaeval inn beside the road, NS 431561, has been graded, and all around the 'inn' foundations lie numerous sherds of Mediaeval pottery of different wares. By Ainsley (1789) this road is partly mapped. Beyond Caldwell the line follows a field boundary to Braco Farm, NS 41505578. This is patently a Mediaeval road.

However it must be observed that the name 'Harelaw' persists in the farm, NS 49706055, north of Cross Stobs, just to the east of 'Harelaw' burn, while the cup-marked rocks to W.N.W., NS 49056108, are recorded as on 'Harelaw Craigs'. This would place the name 'Arlaw' on the same road as le Rass, i.e., the old Paisley to Cross Stobs to Barrhead road, on which the name Conwarren can no longer be identified. If so, the Latin with the second preposition '*de*' governing Stokbryg becomes logical, and only two main roads are indicated. Of these the Cross Stobs to Barrhead road may well lie close to our missing Roman road.

As for the road from Stokbryg: while several authorities have discussed the phrases "*prope pontem de Clud*" (1285) (McGeorge 1888: 98, 142), and "*ad pontem Glasguensem*" (1487) (Stuart 1847: 162), referring them to the former wooden bridge of Henry the Minstrel (Blind Harry), which by 1488 had been rebuilt in stone (Renwick and Lindsay 1921: 127), and relating the name to an equation of *vicus pischatorum* with Stokewell, hence Stokewell Bridge or simply Stok Bryg (McGeorge 1888: 143), it should be noted that Stokbryg appears on the Rental Roll of Paisley Abbey of 1406.

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## AN INVESTIGATION INTO THE HISTORY AND FUNCTION OF THE SO-CALLED CHARCOAL BURNERS' PLATFORMS IN THE WEST OF SCOTLAND

By ELIZABETH B. RENNIE  
*Dunoon, Argyll*

### Introduction

There is good reason to believe that the so-called 'Charcoal Burners' Platforms', so plentifully distributed throughout the West coast of Scotland, were not built, as had been previously assumed, by the charcoal-burners associated with the Iron Furnaces of the 18th and 19th centuries, but had a much earlier existence.

The purpose of this paper is to prove this theory, and towards this end it has been necessary, firstly to make an historical examination of the established methods of making charcoal, mainly in England but also in Scotland and other places, prior to and contemporaneous with the period of the Iron Furnaces, through both documentary and field research.

Secondly it has been necessary to survey, or re-survey, many of the 'Groups' of these so-called Charcoal-Burners' Platforms and to excavate some of them. The detailed results of these surveys and excavations are being published elsewhere, but the evidence gathered by this research is incorporated here to arrive at and support the above conclusions.

It is concluded that, although the original 'Platforms' were not actually built by the Industrial Colliers of the 18th and 19th centuries, excavation shows that some of the platforms had a secondary use as charcoal hearths for these very Iron Furnaces.

The evidence is presented in the main body of the text. Appendix 1 lists the round and rectangular hollows recorded in the course of field walking throughout the West of Scotland. These are thought to be pits and pitsteads where charcoal was made as a folk craft by the local residents. Appendix 2 summarises the results of excavation work at these round and rectangular hollows.

Throughout this paper the term Charcoal-Burners' Platforms has been re-designated Recessed Platforms (contracted simply to platforms), since this term is non-functional and so non-controversial.

## BASIC HISTORY OF CHARCOAL MAKING

## Early Need for Charcoal

From the time when metals - copper, silver, iron, - were first smelted, the need for charcoal must have been of prime importance. John Perlin (1991) even blames the rise and fall of civilizations on the basic need for monumental quantities of charcoal. Yet, although much thought has been given to the 'how' and 'where' of the metal furnaces, the actual charcoal making which must have accompanied the smelting has been largely disregarded. Dr. R.F. Tylecote, however, discusses the respective values of various fuels used in primitive smelting, and lists (1986) the advantages and disadvantages of dried wood, dung, peat, charcoal and coal. He suggests that wood has been charred in pits since the Early Bronze Age, and implies that charring wood in heaps called 'meillors' was a later innovation. He quotes Biringuccio, writing in Italy in the 16th century (see Smith and Gnudi 1843), who tells of making charcoal both in pits and in heaps. Tylecote wonders if trenches found on a Roman iron-smelting site might be examples of rectangular charcoal pits. Tylecote also describes various uses for peat, and notes that peat was used for smithing in the Scottish Highlands, and also in Devon and Cornwall.

## Formerly a Home Craft

Cunliffe (1975: 273) considers that in the 4th and 3rd centuries B.C. iron extraction and forging was a normal home craft, not solely a skill in the hands of specialists. He suggests that there may have been a break in the folk method of extraction during Roman times in the south, since it is thought that at that time, on the Weald, the reduction of iron ore became a professional activity, although, even then, the forging of the iron ingots would remain in the hands of the local smiths. Thus, from about the 4th century B.C. until the 16th century A.D., the making of charcoal must have been a domestic craft comparable with spinning, weaving and basketry etc. It is possible that the domestic charring may have used pits, as Tylecote suggests.

## Emergence of Specialist Charcoal Workers

In the mid-16th century there was a national need for more and more charcoal. The stimulus was the increasing demand for armaments, - cast-iron cannon and cannon balls (Perlin 1991: 166-167). This ever-increasing consumption of charcoal may have been the agent which made charcoal burning a full-time occupation, and may also have encouraged the use of 'meillors'

(air-tight clamps set on a level surface) instead of pits. It is certainly considered that by Medieval times wood charcoal making had become the work of specialist itinerant workers. The 'wood colliers' lived a withdrawn life in the forests and passed on their skills from father to son.

Recently, some of the last of these forest dwellers have had their methods and the language of their craft recorded by four researchers: Armstrong (1978), Rollinson (1981), Kelley (1986) and Linnard (1987). The colliers interviewed were located on the Downs of southern England, in Wales and in Cumbria, but no such colliers have been found in Scotland.

#### Methods of Manufacture

The routine and requirements of wood colliers in the different areas of England are remarkably similar, and the names given to the charcoal pyre and its site are of significance. Only Linnard uses the term 'platform'; the others write of 'kilns', 'meilors', 'hearths', 'levels', 'hollows' and, most significantly and most commonly, 'pitsteads'. Both Linnard and Kelley state that charcoal was originally made in pits, in deep holes in the ground. In Wales, Linnard describes seeing conical pits some five feet deep with charcoal fragments in the soil at the bottom. Kelley goes on to say that in continental Europe the pit was replaced by the earth-covered heap, called a meilor, since it was found to be more efficient. In Britain a woodland charcoal kiln site is still referred to as a pitstead, thus showing its origin.

Rollinson (1981: 142) suggests that a hearth which was neither a pit nor a meilor was used in the Lake District and was in fact a "pit stead". He writes "a shallow pit between fifteen and thirty feet in diameter was dug.... These 'pit steads' or 'pit rings' were usually in level sheltered areas with running water close by, but occasionally, where there was little available level land, a small platform was built out of the hillside to create the pitstead". The charcoal pyre in the Butser Ancient Farm Research Site in Hampshire is set in a pitstead, i.e. in a flattened hollow in the ground about 30 cms deep and about 5.0 metres in diameter.

Linnard states that if level ground was not available a platform was prepared by the 'cut and fill' technique. However he stresses that, even on level ground, the preparation of a new site was hard work and expensive, and implies that the preparation on a slope was even more labour intensive and more expensive. He states (1987: 54) that old sites were also preferred since the 'soil beneath was conditioned and "impregnated to a depth of several inches with tars and

fragments and particles of charcoal, quite distinct from the natural soil".

Kelley (1986: 5) confirms the emission of tars and says "A light and loamy soil would be sought and clay avoided. ....loamy soil is warm and will more readily absorb the moisture and tarry liquids given off by the wood during the process". Armstrong, however, says that there was a danger in charring on a peaty soil (1978: 62) and that "sea sand .... was spread from five to six inches thick on the pit bottom" to avoid the peat below catching alight. Each of these researchers says that the hearth was set as near as possible to the source of the wood, since bagged charcoal was easier to transport than the unburnt wood.

#### Water Requirements

The need for large quantities of water is stated more than once by each of the writers. Armstrong (1978: 64) says that "fifty gallons of water might be used to quench a seven cord kiln" and (1978: 59) "water must be accessible and brought in a cart if there is no stream and put ready in buckets or barrels". Linnard (1987: 54) says "One or more large casks were filled by bucket, for a good supply of water was deemed essential in case of emergency .... and to quench it at the end of the burn", but later qualifies this by saying that "In some places, however, charcoal-burning is managed in such a way as to dispense entirely with the need for water". Unfortunately he does not enlarge on this statement. Common sense suggests that if water cannot be used for cooling the opened pyre then a prolonged time exposure might be the only alternative.

#### Ventilation Control

The four researchers all dwell on the problem of wind. The charring process is more akin to baking than to burning, and so the prepared mound of wood is covered with straw or green bracken and then turf and earth. If at any time during the burn the wind should strike constantly on one side causing it to flare and fall into a hole, the hole must at once be filled and re-covered with turf. Hurdles are kept at hand ready to shield the pyre if the wind rises.

Since the pyre could take anything from two to ten days to char, the collier must be alert day and night to control the ventilation and to protect the burn from the weather. Linnard (1987: 51) gives a graphic description of the difficulties of the collier: "The work is arduous by day, but at night the problems are worse. Charcoal-burners talk of slipping and stumbling on the slopes, in inky darkness and in rain and

wind". Rollinson (1981: 143) states that "Once one pit was kindled, a second, third, and fourth followed in succession, and during 'coaling' work went on day and night for seven days a week without respite through the late summer and early autumn".

#### **Constant Attendance**

Since the charcoal-burners had to be in constant attendance, a hut was built close to the site with the door facing the kiln (Kelley 1986: 8). The huts were built on a wigwam plan, i.e. poles 12 to 14 feet long were set in a circle about 10 feet in diameter and the tops lashed firmly together. The framework formed was then covered with brushwood and turf. This form of construction seems to have been uniform throughout the country, since all researchers describe the huts. The same form of structure was used for the colliers' families, who lived seasonally, or in some places permanently, in the woods.

Illustrations of about 1760 A.D. in the books by Armstrong (1978), Kelley (1986) and Perlin (1991) show four or five kilns at different stages of charring clustered within a small area. Linnard in unpublished material (personal communication) confirms this arrangement, and states that hearths are frequently found in small groups so that two or more men could handle pyres at different stages at the same time. In the same material he confirms the evidence shown in the photograph on page 61 of his paper, i.e. that when a pitstead has been used several times a raised mound of earth forms around the edge. Such a mound can be seen in the photograph. He adds that, although the contingencies are many, the number of hearths which were likely to be found in 20 acres of woodland might be between 14 and 20.

These observations will be considered further in the section on Industrial Charcoal Making in the 18th and 19th centuries in the West of Scotland.

#### **Various Fuels**

An earlier researcher was the scientist John Percy, who wrote in 1875. He did not describe the actual method of charring, but he was interested in the various fuels used in metallurgy and their efficiencies. Charcoal was one of the fuels discussed, and he described the various meillors (kilns) which were used in different countries to produce the char. He stated (1875: 384) that in China charcoal was made in pits. He also recorded the fact that peat was used as a source of charcoal in many European countries, and gave instances in the 17th and 18th centuries in England and Ireland where peat

charcoal was being made on an industrial scale, although by the time Percy was writing in the 19th century "the use of peat-charcoal in metallurgical operations in Great Britain is either very restricted or must be kept rigidly secret" (1875: 513). This observation on the use of peat is of particular interest when considering its use in Scotland in the 18th and 19th centuries.

#### CHARCOAL MAKING IN SCOTLAND

##### Bloomeries

In Scotland, little research into the history or the methods of 'wood coaling' has apparently been undertaken, yet there is visible proof to be seen on the hills that charcoal making must have been a commonplace and frequent occupation. The proof is the number of 'bloomeries' where iron was made from 'bog-iron' - a type of iron stone taken from wet areas on the moors. The bog-iron was baked with a quantity of charcoal, in a clay-lined and clay-covered pit, to produce a small quantity of pure iron. These sites on the moors can now be recognised by the heaps of discarded waste material. In 1886 Macadam listed 100 bloomeries in Scotland but said that his list was far from complete. In 1969 Aitken also compiled a list of bloomeries, with map references, which had been visited in the 1960s. By 1990 the incompleteness of these early lists was manifestly apparent, particularly in the West of Scotland, as early iron-making sites are constantly being uncovered by forestry ploughing. These discoveries are now so regular that the slag heaps are treated as commonplace and many are not recorded. These simple bloomeries are proof that charcoal must have been made in great quantities throughout Scotland from the beginning of the Metal-using Period to the Industrial Revolution and even later.

##### Few Specialist Charcoal Workers in Scotland

It is possible that in the south and east of Scotland specialist charcoal burners of the English variety may have operated and circulated. However, in the rugged country of the West, cut by the sea into peninsulas and islands where each man considered himself 'kin' to the chief and part owner of the land, it is most unlikely that there were withdrawn families of charcoal burners. The lack of large tracts of woodland in the West would also act against specialised colliers. The lack of woodland is corroborated by the Military Survey of 1747-55 (see Skelton 1967). Since at that time timber was the only raw material for the making of all domestic and farm implements, it seems improbable that this precious commodity would be charred away if a suitable substitute was known. That commodity could



have been peat, which is plentiful throughout the West Highlands, and documentation confirms that this must have been so.

Thus the making of charcoal was probably a joint activity undertaken by the occupants of each township. It is significant that in the 1790s, in the *Old Statistical Account*, although many trades including 'smiths' are listed as being represented in Argyll, there is no mention of 'charcoal burners', 'wood colliers' or even 'foresters'. It is recorded in various documents that those requiring the services of the smith had to supply their own charcoal; see Ross (1886: 409), Crawford (1964: 112), and Wallace (1886: 353) who says "In former times, when any one went to the 'smiddy' to get any work done, he had to carry fuel of this kind with him", i.e. peat charcoal.

#### Peat and Wood Charcoal

According to Tylecote (1986: 224) peat charcoal was known in Devon and Cornwall as well as in Scotland, and there are also full records of its manufacture and use in Ireland (Lucas 1970). Percy (1875) also discusses it, but seems to know little of its use as a domestic commodity in Scotland. In Scotland, Watson (1904: 80) gives place-name evidence of the practice in the name 'Meall a' Ghuail'. Two sites with this name are to be found on the moors above 1000 feet near Dingwall NH 520650.

The few records which have been traced describe the making of peat charcoal '*gual gaidhealach*' rather than wood charcoal, and it is likely that peat was the more usual fuel, since wood was so scarce. Osgood Mackenzie (1924) in his *A Hundred Years in the Highlands* says "almost within my own recollection the blacksmiths on our west coast did all their own smithy work with peat charcoal.... I can just recollect the Gobha Mor (the Big Blacksmith) at Poolewe. He was the last smith who used it, and with whom died the knowledge and skill required to make it" (1924: 42).

Macadam (1886: 94), however, before listing the bloomeries, says that small quantities of both wood and peat charcoal were made in a deep circular pit sunk into the earthen floor of a house. "A flag with a hole in the centre was placed over a deep circular pit sunk in the earthen floor, and into this pit the embers of the evening fire and any superfluous wood were thrown. A plug was fitted over the hole in the covering flag, and thus the contents of the pit were converted into good charcoal for smithy work, &c..... When the charcoal was required in larger quantity, as for smelting purposes, the preparation was carried on in the vicinity of special peat mosses. The peats were cut from the more dense and compact part

of the moss, and were hard, black, and free from light porous matter. The peats were charred in a deep narrow pit, the mouth of which was nearly covered with wood; an opening was left at the lower part to let in a small amount of air". In the same article Macadam states (1886: 99) that in an area only 80 feet above sea level, where oak and beech were plentiful, many circular pits three to four feet deep were found in the same vicinity as abundant slag. This suggests that wood charcoal made in pits was being manufactured for use in bloomeries.

In a paper published by Alexander Ross (1886) the domestic method of making a small amount of charcoal is described from Jura, by dropping the embers from the evening's fire into a hole in the floor. The article goes on to state that the twelve tenants in the clachan "each pays the smith 15s per annum for his work, the smith being bound on his part to do all jobbing for the tenants. The crofters must each provide and bring his own fuel, blow the bellows and work the forehammer" (Ross 1886: 409).

#### Peat a Necessary Source of Charcoal

Crawford (1964: 109) explains the need to use peat as the source of charcoal in non-forested or deforested areas. He relates a conversation describing the making of peat charcoal in North Uist around 1900. Peat was put into a trench, 8.0 feet x 3.0 feet x 3.0 feet, ignited and eventually the trench was made airtight. After a day or two the charcoal had been prepared and was removed. This activity was undertaken regularly.

From Ireland, numerous descriptions of the making of charcoal from turf (peat) are given by A.T. Lucas (1970). He gives descriptions from various localities as early as the 11th century. The charcoal (*moin-ghuallai*) was usually made in pits beside the bog cuttings and was carried in sacks to the smith. Sometimes the turf was carried and put into a coal pit (*clais a' ghuaill*) outside the forge, and there converted to '*gual do smearoidi mona*'. Descriptions are also given of making turf charcoal in heaps above the ground beside the peat cuttings.

In most of these references to the making of peat charcoal the pit used is described as being rectangular, and sometimes the dimensions are given, although Macadam (1886: 99) explicitly stated that the pits in the woods were round. Other researchers give descriptions of round features which resemble such pits. Gordon (1884: 325) describes hut circles about 12 feet in diameter containing an accumulation of cinders and burnt ashes. Marion Campbell (1958: 16) describes a low ridge with "three well marked hollows in its top, suggestive of

kilns", close to a mound containing charcoal. Also present are the foundations of huts, but although the site is at around 1,000 feet it does not resemble the usual sheiling stance. If it is a location for the making of charcoal, then the charcoal made there must be of peat and the pits are described as round. It may be of significance that one of the burns is called 'Allt nan Sac' - the burn of the bags.

Angus Graham (1919, 1920) gives a very full survey of the six miles of uninhabited territory lying between Tarbert and Skipness in the Kintyre peninsula. Many of the foundations are described as turf huts (1919: 82), but Graham remarks on their very small size, some being only four feet in diameter (1919: 83). Since six bloomeries are listed as being amongst the monuments found (1919: 117), it is manifestly obvious that charcoal must have been made in the vicinity. Thus it is possible that the smaller turf huts may be filled charcoal-making pits. Domestic huts near to the pits are to be expected, and similar groupings of huts and postulated pits are frequently found.

#### Peat Charcoal Manufacture

The accepted practice may have been to use rectangular pits for the making of peat charcoal and round pits for wood charcoal. However a significant reference by James Logan, probably writing about 1840, says "Peats were the usual fuel, and they are yet in general use.... In muirs, deep narrow pits are frequently to be seen, where it is said the peats were thus prepared, but the practice at present is to dig holes three or four feet deep, in the form of a bowl or basin, which are filled with peats that are set fire to, and extinguished when sufficiently charred, by being covered with turf" (1876: 203). He therefore suggests that round pits are later than rectangular pits, although the instance described by Crawford from North Uist shows a rectangular pit in use early this century.

#### Charcoal-making Pits

In the course of field walking in the West of Scotland over some twenty years, many circular depressions have been noted but only recently have they been recorded. Many of these are listed in Appendix 1. Even although the recording is recent, their identification is even more recent. It is now possible to suggest that they are the visible remains of charcoal-making pits, as follows:

(1) By the documentary evidence that charcoal was initially made in pits.

(2) Through excavation of nine of the recorded circular pits; see Appendix 2.

(3) By the folk knowledge that charcoal was made in particular localities and the finding of circular depressions in these localities: sites in North Yorkshire (see Appendix 1) and at Loch Maree (see Appendix 1, and below).

#### Iron-works at Loch Maree

J.H. Dixon (1886: 74) tells how in the 17th century English iron works were established around Loch Maree to exploit the deciduous woods. Dixon believed the first of the industrial iron workings might have started at Fasagh, at the south end of the Loch, and here he states there is evidence of extensive charcoal burnings (1886: 91). This area was recently visited, and many depressions both rectangular and round (some as deep as pits) were found in the area. Hollows and pits were also found in great numbers on the opposite east side of the old iron-working area. Descriptions of these are given in Appendix 1.

At the north-east end of the Loch, on the east side of the River Ewe, is the Red Smiddy. This is thought to be the latest and the last of the Iron Furnaces to operate. Dixon says "There are evidences of extensive charcoal burnings on several flat places along the East bank of the Narrows of Loch Maree for a space of nearly half a mile above the Red Smiddy" (1886: 95). This area was also re-visited, and two particular places noted. One, within quarter of a mile of the furnace, was a flattened area with three 'scallops' cut into the hillside immediately above the river bank; here there was also evidence of structures. The other flat area was half a mile beyond, still on the riverside. Here three trenches, and possibly seven circular pits, were found on a peninsula between the river and a bay. On the opposite side of the river Ewe another three circular depressions were recorded. Descriptions and plans of these are given in Appendix 2.

#### Charcoal Hollows

Many similar circular hollows and a few rectangular ones have now been recorded from all over the West (Appendix 1). They are usually found in groups of three to five, and although a lone one may appear to be single this may simply be because the surrounding area has not been sufficiently searched. In thick heather, bracken, or heavy leaf litter, such hollows can be difficult to recognise. The groups are randomly distributed and have been found in woodland, on moors, and from sea level to around 600 feet. They are frequently recorded as having been

found above, between and even on the surface of the Recessed Platforms, but this association is probably apparent rather than real, since these areas have all been thoroughly walked and carefully noted. This relationship is at present being reassessed (Rennie, in preparation).

Hollows are often associated with bloomeries and sometimes with small oval turf foundations. The round ones have internal diameters from about one to three metres. Some are enclosed by a low bank, perhaps containing a few big stones; others are simply depressions. Even without excavation some of the hollows are as deep as 0.75 m, whereas others are very shallow and almost impossible to recognise. It is very possible that many are not now recognised at all, since the hollow has filled and levelled out naturally over the years. Lists of the known depressions, with map references, dimensions and descriptions, are recorded in Appendix 1.

Appendix 2 gives details of the excavation of nine round hollows, plus the report of a partial excavation of an oval turf foundation which was associated with an excavated round hollow.

The excavation of these round hollows shows that all were initially pits about 1.0 m deep and 1.5 m in diameter. All except the three at Upper Kilail Burn showed evidence of having encountered a heating or baking internally. All except the same three had contained soil which was heavily impregnated with charcoal. Most were clay lined. One was closely associated with a slag heap and had slag and Victorian pottery within the pit. Others, including the three at Upper Kilail Burn, were close to slag heaps. Another had a thick scattering of charcoal immediately beyond the edge of the lip.

Graham (1920: 199) draws in plan and section the remains of a hut-circle which had been partially destroyed by a burn. He states "it is interesting, further, to note the pit system of house-building continuing in use during the Middle Ages". Since the pit and much of the strata he describes greatly resemble the pits and levels described in pit excavations elsewhere, it is possible that this pit was also a pit for the making of charcoal.

#### **Peat or Wood Charcoal Pits**

As yet, it is difficult to tell whether any particular pit was associated with wood charcoal or peat charcoal, although the findings in the pits at the Upper Kilail Burn suggest that these pits, and others on open moorland, may have been for peat. The available documentary information suggests that peat

charcoal was made in a rectangular trench, but Logan's comment may imply that peat charcoal was eventually made in round pits too. Dixon (1886) suggests that timber rather than peat was being used around Loch Maree, and since both types of pit have been found there, both types in this area or at that period may have been used for timber.

Many of the depressions listed resemble the descriptions given by Rollinson (1981) of a 'pitstead', i.e. "a shallow pit between fifteen and thirty feet diameter". Most of the hollows observed, before excavation, are smaller - on average 10 feet (3.0 m) in diameter - but some correspond with Rollinson's larger dimensions; see depressions noted at NN 017277 in the Muckairn list (Appendix 1). The excavated pits (Appendix 2) appeared by the final use to have become nearly flat surfaces, thus meriting the name pitstead. The Dunloskin Pit is the only one which was deep enough to be so described before excavation (Appendix 2).

This re-use of a filled pit may illustrate why meillors on flat surfaces were eventually found to be as satisfactory as pits. It also explains the reason for the name pitstead. The fact that, on Loch Maree side (Appendix 1), three scallops are cut into the hill on the flat area nearest to the Red Smiddy may be significant. It is possible that meillors, the traditional English charcoal pyre, may have been introduced there in the later years of the furnaces' life by industrial workers from the south.

## INDUSTRIAL CHARCOAL MAKING FOR THE IRON FURNACES

### Establishment of Iron-making Furnaces in Scotland

From the 17th to the 19th centuries many iron-making furnaces were established in Scotland by Iron Masters from Cumbria and Ireland. They came to Scotland to exploit the oak woods as a ready source of charcoal for use in the furnaces. The last group to operate was the Lorn Furnace, built at Bonawe in the mid-18th century by a company from Ulverston in north Lancashire. It closed in 1876. Little is known about the practices of the iron workers, except in Taynuilt on the south side of Loch Etive, where there is still a folk-memory among the descendants of the employees. This folk-memory relates in particular to the workers who made the charcoal in the woods of Muckairn parish. In these woods there are many round Recessed Platforms cut into the steep hillsides. These are said by the local people to be the hearths built and used by the charcoal burners making charcoal to fuel the Lorn Furnace. This group of Recessed Platforms has been thoroughly surveyed, and will be

described in a forthcoming publication relating to all the Recessed Platforms known in the West of Scotland (Rennie, in preparation).

#### Lorn Furnace

There is, however, one source of documentary information about the charcoal and fuelling arrangements for the Lorn Furnace; by J.M. Lindsay. In 1975 Lindsay researched the correspondence and manuscripts relating to the Newland Company of Furness, Cumbria, and focused upon its West Highland branch, i.e. the Lorn Furnace at Bonawe. From the Company's records he extracted much information about the leasing of the woods and the work routine of the charcoal burners.

#### Groups of Platforms

Prior to the survey and research work done for the pending publication about Recessed Platforms, only a few groups, other than those at Muckairn, were known. Some are also in areas near Muckairn, with others at Taynish, on Loch Fyneside, and in Mull. These were all considered to be Charcoal Burners' Platforms, by their similarity to the Recessed Platforms of Muckairn and perhaps because of a folk-memory of their use. This opinion is illustrated in the volumes published by the Royal Commission on the Ancient and Historical Monuments of Scotland; see Argyll Inventory, Volume Two, *Lorn* (1975: items 360 and 361), and Volume Three, *Mull* etc. (1980: item 386). It is, however, qualified by a statement in Volume Six, *Mid-Argyll and Cowal* (1988: 36).

Current research and field walking has identified another 86 groups in the West of Scotland. In this present paper only a brief general description can be given of the platforms and the groups in which they are found, but detailed information is given in a forthcoming publication, which also describes the excavation or partial excavation of ten of the Recessed Platforms (Rennie, in preparation). Between Carradale in Kintyre and Lochaber, 89 groups are now known. The Cowal area has been systematically searched and it is thought that most of the groups there, and some single platforms, have now been located and recorded. Throughout the rest of the area, groups have only been found fortuitously. Thus it is extremely probable that many more groups and singletons await discovery.

#### Construction of Platforms

The platforms are round flat areas, recessed into the hill by digging out material from the rear and throwing it forwards

to create a mound on the downhill slope. This has then been flattened and levelled to form a round foundation. In some cases the front consists simply of banked earth, but in other cases large stones, or even boulders, form a kerb around the front. Sometimes the front consists of a coursed dry-stone wall, and this type of front is often combined with a coursed stone wall set against the curve of the back bank. In some cases, natural rock falls have been utilised as a basis on which to build the front lip.

Platforms can be recorded as 'recessed', but the amount of recession varies from as little as  $60^\circ$ , when there may be as much as  $300^\circ$  of front lip, to almost complete recession and hardly any front lip. Such platforms resemble hut circles.

The heights of the front lip and the back scarp depend upon the steepness of the hill into which they are cut. Some cut into very precipitous hillsides can be as high as 2.5 m at the front and back. Those at Gualachulain, Loch Etive are the most dramatic, but are not unique, although the stone work associated with these groups are particularly massive since boulders over one metre in diameter have been used to build the vertical front faces.

Gentle slopes, and terraces, both natural and man made, need only low front lips and back banks. Platforms where there is no kerbing can be hard to recognise, and many may have been overlooked. One of the Tainish group was initially described as a round flat area with a low front kerb, but when excavated it was found to stand 0.75 m above swampy ground with a double-banked deeply recessed stone rear.

#### **Size and Distribution of Platforms**

The size of the platforms varies from 18 feet (5.5 m) to 45 feet (14 m), and the sizes seem to increase in three feet stages. This gradation may be contrived, since measuring the diameter can be difficult and figures are apt to be rounded up. In every group, however, the ratio of size is the same. The statistical curve shows that each group starts with a few small platforms, then rises to show a majority of intermediate ones, peaks at a central measurement, and then falls away to finish with a few large platforms. In the northern groups the peak seems to be at sizes larger than in the more southern groups; e.g. in the north there are more 27 feet and 30 feet platforms, whereas in the south there are more 21 feet and 24 feet platforms. This north and south divide is not constant.

There also appear to be various patterns for size distribution. In some groups the larger platforms are spaced



out, with smaller ones around; in others the larger platforms are grouped on the better ground, with the smaller ones on less attractive slopes; while in others the larger platforms can be either at the extremities or centrally placed.

Platforms are found from sea level to as high as 1,400 feet. In no single group is the range as great as this, but in a few they do lie from sea level to 700 feet. Platforms can be found in woods, on heather moors, on improved pasture land, in marshy areas where they are water-logged, amongst rock falls and cliffs, and high above the moors on scree slopes immediately below inaccessible rock faces.

The number of platforms found in any particular group ranges from 2.0 to 228, and some singletons have been found in Cowal. There is no average number which can be quoted, but of those surveyed the majority are below 40 in number, although groups of above 40 are quite common. Since 50% of the groups have not been surveyed, these figures are not categorical.

#### **Charring Process**

Although Lindsay gathered so much information about the charcoal procedure, he does not give an actual description of the charring processes used. He does, however, say that the Cumbrian Wood Agent employed local labourers as 'master colliers' (1975: 287), and it is reasonable to suggest that these workers were trained in the charring methods used in Cumbria at that time. These methods can therefore be illustrated, with every possibility of authenticity, by the four previously-noted researchers from England, particularly Rollinson (1981), whose account is given earlier in this paper.

These methods indicate that there were particular requirements for charcoal making. These are positions which gave shelter, proximity to water, plus level ground extensive enough to accommodate a few pyres, and all within easy reach of the standing timber. Frequently such positions on hillsides were not utilised for Recessed Platforms, presumably for some of the following reasons:

1. They are often in very exposed positions set on prominences facing into the prevailing wind.

2. Many are not near water, or are in such positions that getting large quantities of water to the site would be extremely difficult.

3. Level areas have not always been used, and built platforms can be found immediately below or above flat areas which seem quite suitable.

4. Only the very largest platforms - greater than 36 feet (11 m) in diameter - could hold more than one pyre, and there are only about six of these altogether. Single hearths, each on a platform and spread out over the hillside, would make a collier's task extremely difficult when overseeing three or four pyres at a time.

In addition, Linnard (1987) tentatively suggests that 20 acres of woodland might need between 14 and 20 pyres to char the timber. In Scotland, at only two such sites have such concentrations been found, and at both of these sites it is only in one area of the hillside that the number of platforms has been so great; the concentration over all of the sites is an average of seven platforms to 20 acres.

### Felling of Woods

Lindsay (1975) collected some information which is relevant. He explains that, apart from Muckairn, most woods were used or were expected to be used, i.e. clear-felled and charred, in one season only. Even when it was expected that a wood would be re-used, there would be a 20 to 24 year interval - almost a generation - before the next cutting. He emphasises that time was at a premium, and that the complete operation had to be carried through in one year. The facts he gives are as follows:

1. The only woods which were leased on a long-term contract were those of Muckairn parish, i.e. the woods around Lorn Furnace. Initially it seems to have been considered that these woods would give a sufficient supply of charcoal, and they were leased from 1750 until 1852. In 1753 it appears that the supply of timber was found to be inadequate, and a further contract was then made with the Earl of Breadalbane for other woods (Lindsay 1975: 290). This was for three cuttings of woods, at intervals of approximately 24 years, on upper Loch Etive and on the west side of Loch Awe. Even this was found to be insufficient, for still more woods - supplementary contracts - were then leased, and charred for single cuttings only. These additional sources of timber gradually extended farther and farther away from the Lorn Furnace, and were mostly reached by sea. It was uneconomic to transport the charcoal for long distances by pack pony, particularly since the charcoal could also become broken and crumbly. These supplementary supplies are shown on the accompanying distribution map (Figure 1) compiled by Lindsay.

2. No wood could be cut more than once within 20 years, although in one of the contracts it was twice within 48 years. Lindsay calculated that, to keep the furnace working at full

LINDSAY'S DISTRIBUTION MAP OF THE  
 SUPPLEMENTARY SOURCES OF CHARCOAL FROM 1786 TO 1810

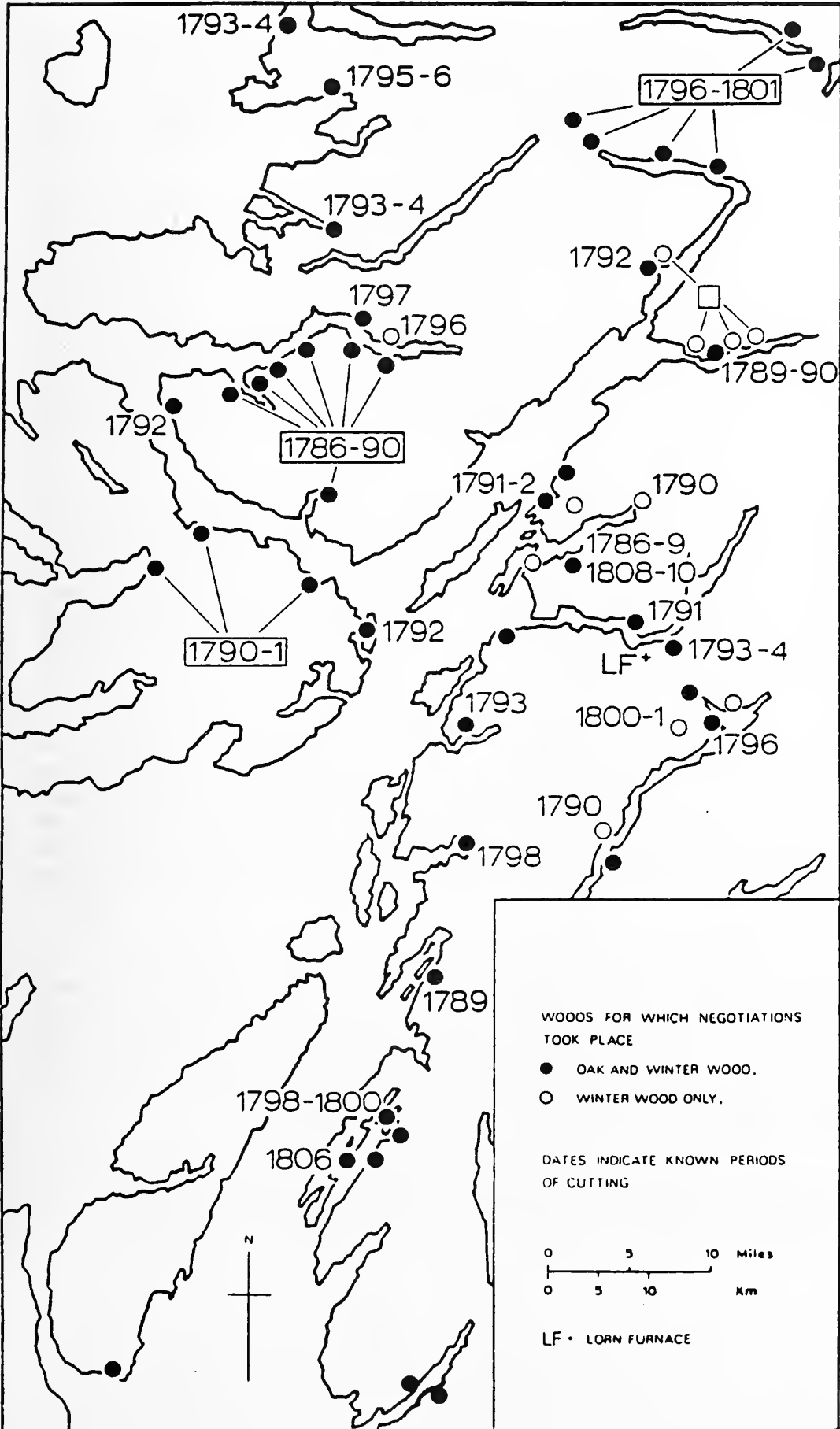


FIG 1

blast, 438 acres of woodland had to be charred each year. He quotes other authorities who also have estimated the amount, at either higher or lower acreages, but none is less than 119 acres per annum. Thus, at the very lowest estimate, at least 3,000 acres were needed over a 20-year period to keep the Lorn Furnace in operation.

3. The Company officer in complete charge of the charcoal side of the operation was on the staff, and was known as the 'Wood Agent'. He arranged for the leasing of the woods, and controlled the quantity and the transporting of the charcoal. Under him were a few 'master colliers', who were local men and who recruited their own teams of workers. Lindsay suggests that these workers were local to the area which was being cut; the men to do the actual felling, and the women and children to do the lighter gathering and stacking. Presumably the men were also in charge of the actual burning pyres, but Lindsay does not state this.

4. In any one area, the complete operation of cutting, charring and transporting had to be completed within a year. In the summer the oaks were first stripped for tanning and were left. The complete area was then clear-felled from one side to the other and then 'coaled' during the winter. In the spring, the stripped oak was coaled. The master colliers with their horses, which had always to be considered, were then ready to move on to a new area.

#### No Evidence for Industrial Building of Platforms

None of these arrangements states nor even implies that time was set aside for the building of platforms, and it must be emphasised that time was valuable and the regular routine of clearing a particular site had to be accomplished within the year. Furthermore, it was expected that the clear-felling would be a once-only operation or at least a once-in-a-lifetime operation.

Under these circumstances, it is difficult to believe that effort and time were used to cut and build platforms, particularly high stone-fronted ones. It is much more likely that the wood was charred on the nearest flat area and if a Recessed Platform was available it would be accepted and used. Natural larger flat areas were probably preferred, to allow for the burning of several pyres at the same time.

According to the four researchers the pyres were built as near as possible to the place where the wood was cut, but even if the colliers had expected to return to the same woods, they certainly could not know twenty years in advance precisely

where the new timber would be growing.

The Muckairn group is the only one where these arguments have to be qualified. Here the colliers did know that they or their descendants would be clear-felling and charring the woods in subsequent years, since the woods were leased for 100 years, and it would therefore be expected that four to five cuttings could be made in that time. Furthermore, in Glen Nant, which is in the Muckairn woods, the concentration of platforms did approximate to the figure of between 14 and 20 pyres to 20 acres, which Linnard suggested was the usual expectation.

However, Glen Nant, where the platform concentration was so high, only occupies about 17% of the Muckairn woods, and in the remaining 83% of the woods the platforms are very sparse. Yet the Lorn Furnace leased all of the woods of Muckairn parish for 100 years. It is undisputed that the whole area of the woods would be cut, since the Company would clearly try to get as much charcoal as possible from its home ground. Charring would therefore have taken place throughout the entire area, but must presumably have been carried on without the use of platforms over the greater area of the Muckairn woods. The only other explanation for the lack of platforms in the majority of the woods could be that the timber was carried to the platforms in Glen Nant, in some cases one mile away. This would have been completely contrary to existing charcoal burning practice, which was to char the timber where it was cut. Furthermore, Glen Nant, where so many of the platforms are, is a most unsuitable place to choose for a postulated charring area. It is extremely steep sided rising at a gradient of about 1:2 up to 300 feet. Many of the Glen Nant platforms are cut into this steep hillside, giving front and back scarps of 1.5 m to 2.0 m. The inference is therefore confirmed that charring must have taken place on areas where there are no platforms, i.e. on naturally flat areas where no discernible evidence now remains.

#### Initial Use of Platforms

A fact which may give a *terminus ad quem* for the initial use of some of the platforms, and which shows that they could not originally have been associated with the Lorn Furnace, is the presence of a well engineered and cambered pack horse track. The track is thought to be Medieval in date (Rennie), and it has crossed some of the platforms, damaging some and forming a hollow way through others. Thus even at Muckairn the evidence suggests that the Recessed Platforms were used, but were not built, by the Charcoal Burners.

Throughout J.M. Lindsay's collected information, even in his full doctoral thesis, there is no mention of platforms -

the word is not used. He refers once to a pitstead. The reference appears in his full thesis (unpublished) and it is in a letter of complaint about the tenants of a farm at Oib, Knapdale, who have ploughed in the woods and damaged ten or twelve pitsteads "which was made use of in the former cutting.... If a crop of grain is now upon them the company will not be accountable for the damage" (to their crop). The lawyer is then requested to direct the tenants to avoid the old pitsteads, the roads and the shipping bank "to prevent disputes thereafter". Reason suggests that the Wood Agent was referring to the features recognised today as platforms, and that he equated them with the pitsteads of Cumbria. It also implies that the colliers used the platforms but did not build them.

## Conclusions

### Recent Excavation of Platforms

Ten of the Recessed Platforms have been excavated or partially excavated (Rennie, in preparation). The excavations show that five of them had been re-used as charcoal hearths, one had been re-used for iron-making in the 13th-14th centuries A.D., one had been re-used for a bonfire (probably recently), two had secondary floors not used for charcoal burning, and only one had a single period of use, - again, not for charcoal making. Nine of the platforms excavated - four in different areas, three in one area and two in another - showed evidence that they had been built as the foundations for round wooden roofed structures. In three of these the front sockets of the structure were one metre deep, and at the time of the platforms' construction the stones of the front lip had been set around posts already in position.

Of the five platforms re-used for charring, at two of them it appeared that the Industrial colliers knew there was a built floor under the turf and had de-turfed the surface to utilise the existing floor, and at three the floor of the collapsed platforms had been levelled up to take the pyre.

At Lephinchapel, Ardnadam/Dunloskin, and Gualchulain the stone front of the platform had fallen away before the secondary use by the colliers. Charcoal had been brushed over the broken front lip and had gathered in the perimeter sockets which remained in section only.

### Charcoal Burning a Secondary Use

At Taynish, proof that charcoal burning was a secondary use of a platform has been captured in a photograph, where, in the back baulk at the rear of the platform, the charcoal floor

shows as a black line above the primary floor.

It is statistically unlikely that the ten platforms which were chosen for excavation, out of over 1,800 now known, would be the only ones built as foundations for round timber-framed structures. Those chosen for excavation were not picked because of any special shape, or position; the usual criterion was the ease of access from the road for the excavator. Thus the evidence again suggests that the Recessed Platforms were not built as Charcoal Burners' pitsteads.

#### Platforms Not Built as Charcoal Hearths

A final incontestable argument that some platforms were not built as charcoal hearths is their altitude. By the 18th century, woods above 500 feet were unlikely to be luxuriant enough to make industrial charring viable. Many of the northern groups stretch far above this altitude, e.g. Glen Nevis, where the lowest platforms are above 300 feet and the highest are at 1,400 feet. Many of the more southern groups rise to 600 feet, where the platforms are set on bare moorland. If woods were once present at that height, it could be argued that when the trees were felled for charring the ground may not have been subsequently enclosed, and so regeneration could not occur. This is most unlikely, since a hill carrying a wood thick enough to make charring viable, could not, after cutting, revert to a covering of peat and heather within 100 years. Maps of 1860 show the woods of that date to have the same limits as the woods today.

It has been argued that platforms at such heights might have been used as charring hearths for local iron-making at an earlier date, and so have an earlier use unassociated with the Furnaces. It is possible that thinner and sparser woodland might have sufficed for local needs, but the present research into Scottish charcoal-making has shown that pits, not flat platforms, were used for both wood and peat charcoal. Thus it is evident that the remarkable stone-fronted platforms, found at 700 feet and above, must have had some use other than for the making of charcoal.

#### Supply of Timber and Distribution of Platforms

Lindsay's distribution map (Figure 1) shows many of the farms or estates whose ground was leased to supply supplementary timber for charcoal. Unfortunately the scale is too small to show, nor could Lindsay tell from the correspondence, exactly which woods were signified. The distribution shows roughly the same distribution as that of the platform sites, but there are very many discrepancies. Groups

of platforms are found where there is no evidence that the ground was leased, and, more significantly, Lindsay shows some ground to have been leased, and presumably charred, where no platforms have been found. Examples are the Dunstaffnage peninsula, the east side of Loch Craignish, and the south-east tip of Jura. This suggests that charring there must have been carried on without the need for platforms.

Unfortunately Lindsay's map does not cover the Loch Fyne area, as his thesis concentrates mainly on the Lorn Furnace. However he does give some information about the Argyle Furnace, south of Inveraray. He states that Lorn's area of interest was north Argyll and the Atlantic coast as far south as Knapdale. The Argyle Furnace's area was around Loch Fyne and the west of Cowal. The two areas were separated by Loch Awe; Lorn worked the west shore and Argyle the east.

The *Old* (1790s) and *New* (1840s) *Statistical Accounts* give a little information about tree felling for charring in Cowal.

The *Old Statistical Account* (Stewart 1792: 563) says that, across Loch Fyne from the parish of Strachur and Strathlachlan, a new Iron Furnace had been established by an English company. This was the Argyle Furnace. The entry states that both men and women were employed in the woods, to cut and peel timber and to make charcoal. The *New Statistical Account*, discussing the same area, says that 1,600 to 2,000 acres were "under wood of all descriptions" and that the timber was periodically felled and thinned (Ferguson 1845). The former extent of the woodland has been confirmed by the present owner of part of this area, who said that cutting and coaling of the woods took place all along the hillsides on the east of Loch Fyne, a distance of approximately 15 miles. In this area two large groups of platforms and one small one extend over a total of 376 acres of hillside. It therefore follows that over the other 1,200 to 1,600 acres the charring must have been done without the use of platforms.

In the *New Statistical Account* another parish in which charcoal-making is discussed is Inverchaolain. There it is stated that, in 1841, 583 persons were employed to coppice the oak woods, which extended to 1,000 acres (McTavish 1845). It does not say they were charring the coppice, but it does state that the coppicing was done every 20 to 21 years. In this parish there is only one platform group, which covers only 114 acres. Thus again, if the coppice wood from Inverchaolain was charred, 800 acres of woodland must have been reduced without using platforms. It is of interest that one platform of this group was excavated, but it had not been re-used as a charcoal hearth.



Throughout the area, 89 groups of platforms are known. In total, these consist of over 1,800 platforms; 1,009 from 34 groups which have been surveyed, 588 known from 54 groups which have not been fully surveyed, and an estimated 220, a figure which has been calculated by suggesting an average of 20 platforms from eleven known groups which have not yet been visited.

#### **Platforms Not Built for Industrial Iron Furnaces**

Reason, and the considered facts recorded in this paper, make it impossible to believe that the platforms were built in the 18th century by or for the colliers of the Industrial Iron Furnaces. It is equally inconceivable to classify them as platforms built previous to or after the 18th century by the local people for their own charcoal requirements, since it has been shown that these people were making their charcoal in pits.

It is much more logical to suggest, as has been discovered by excavation, that the colliers discovered the platforms in some of the woods and exploited them as firm level areas suitable for their pyres. Because of this re-use, however, the platforms became known to subsequent generations as Charcoal Burners' Platforms, which implied, and was widely accepted, that they had been constructed by the workers for the Industrial Iron Furnaces. It is hoped that this interpretation will now be re-assessed.

### **Appendix 1**

A summary of the evidence provided by the round and rectangular hollows is presented in the following Appendix 1. For convenience, all the round and rectangular hollows, plus other associated features, are considered in order by following the established sequence of the Ordnance Survey National Grid squares, from south-west to north-east, i.e. the Scottish 100 km squares NR, NS, NM, NN, NG, NH, and then SE (Yorkshire). As far as possible, within each 100 km square all items are arranged according to their National Grid references, beginning in the south-west and reading in sequence along the eastings lines.

It should be emphasised that the following list can not be a comprehensive catalogue of all the hollows, depressions, etc present in the relevant areas. At present, to some extent the list must be confined to those features discovered during associated research work on the Recessed Platforms of the West of Scotland, but it is believed that enough material is presented here to provide proof for the thesis. A more detailed

consideration of the available evidence is in preparation (Rennie, in preparation).

NR. Knapdale; Cowal.

NR 732847

Taynish, Loch Sween.

Just within the trees, in the stretch of land between a peat cutting area and the woods, there are numerous circular depressions or pits. They vary in diameter from 2.0 m to 4.0 m externally and in depth from 0.25 m to 0.75 m.

NR 938839

Corra, Otter Ferry.

Within the south-west quadrant of the enclosure on Tom Buidhe, there is a circular hollow about 2.5 m diameter externally.

NR 942844

Kilail (Fuar Bharr), Otter Ferry.

There are three mounds of slag close together beside a burn, set on the same patch of hard grassy ground. Within 25 m to the north-west there is a circular depression in the heather. The farmer states that there are three other depressions, with 200 m of this one, lower down the hill and amongst the few trees which grow beside the river.

NR 943834

Strone, Otter Ferry.

East of the Strone farm road, south-east of its junction with the Beallochandrain Hill road, there is a group of circular foundations with hollows in the centre.

One is in the conifers about 80 m to the south of the main road ('e').

Three are immediately beyond the wood on the moor to the south ('f', 'g' and 'h'); 'h' has an overall diameter of 6.0 m with an internal hollow of 3.0 m.

Some 50 m to the west there are two oval structures 10 m x 50 m ('i' and 'j').

NR 943834

South of Kilail Burn; north of Beallochandrain Road.

Opposite the junction of the Strone farm road with the

Beallochandrain road there are foundations of two turf-walled houses ('k' and 'l').

Immediately to the west there is a slag heap, 14 m in diameter and 2.0 m high on the down slope side ('m').

There are two embanked round depressions, some 3.0 m in diameter, 100 m to the north and about 50 m to the north-west of the slag heap ('n' and 'o'). These also have been excavated; see report on Upper Kilail Burn in Appendix 2.

It is probable that these groups around the head waters of the Kilail Burn are all associated, including the groups not shown in Figure 2. It is suggested that there are two periods of settlement, represented by the earlier houses 'a' and 'b' and the later houses 'l' and 'k'. It is possible that all were engaged in iron making from bog iron - thus slag heap 'm' - and the various pits may have been for the making of peat charcoal necessary for the iron production.

#### NR 945835

'An Socach', Otter Ferry.

In the area between the two branches of the Kilail Burn there are turf foundations of five oval structures; four are contiguous and all range between 4.0 m x 7.0 m and 6.0 m x 8.0 m (see 'a' in Figure 2).

Within the An Socach ground and 20 m south of the contiguous foundations there is an embanked depression 2.0 m in diameter with no entrance ('c').

Some 100 m to the west across the burn there is a rectangular turf foundation, 12 m x 6.0 m with rounded corners, opposing doors, and walls spread to 2.0 m ('b').

About 150 m to the west of the rectangular foundation there are two circular depressions, at NR 944834, each 2.0 m in diameter ('d').

#### NR 950838

Kilail Burn, Otter Ferry.

In the northwards curve of the Kilail burn, between the power line and the burn, there are numerous pits and oval foundations. Apart from the last, these all follow the course of the burn. The ground is inclined to be boggy and is covered with tussocky grass, but the features are all set on firm ground.

NR 946833 - One near-circular foundation, with central hollow; at road side (see Figure 2, Pit 'p'). External measurement

SETTLEMENTS ON THE UPPER KILAIL BURN

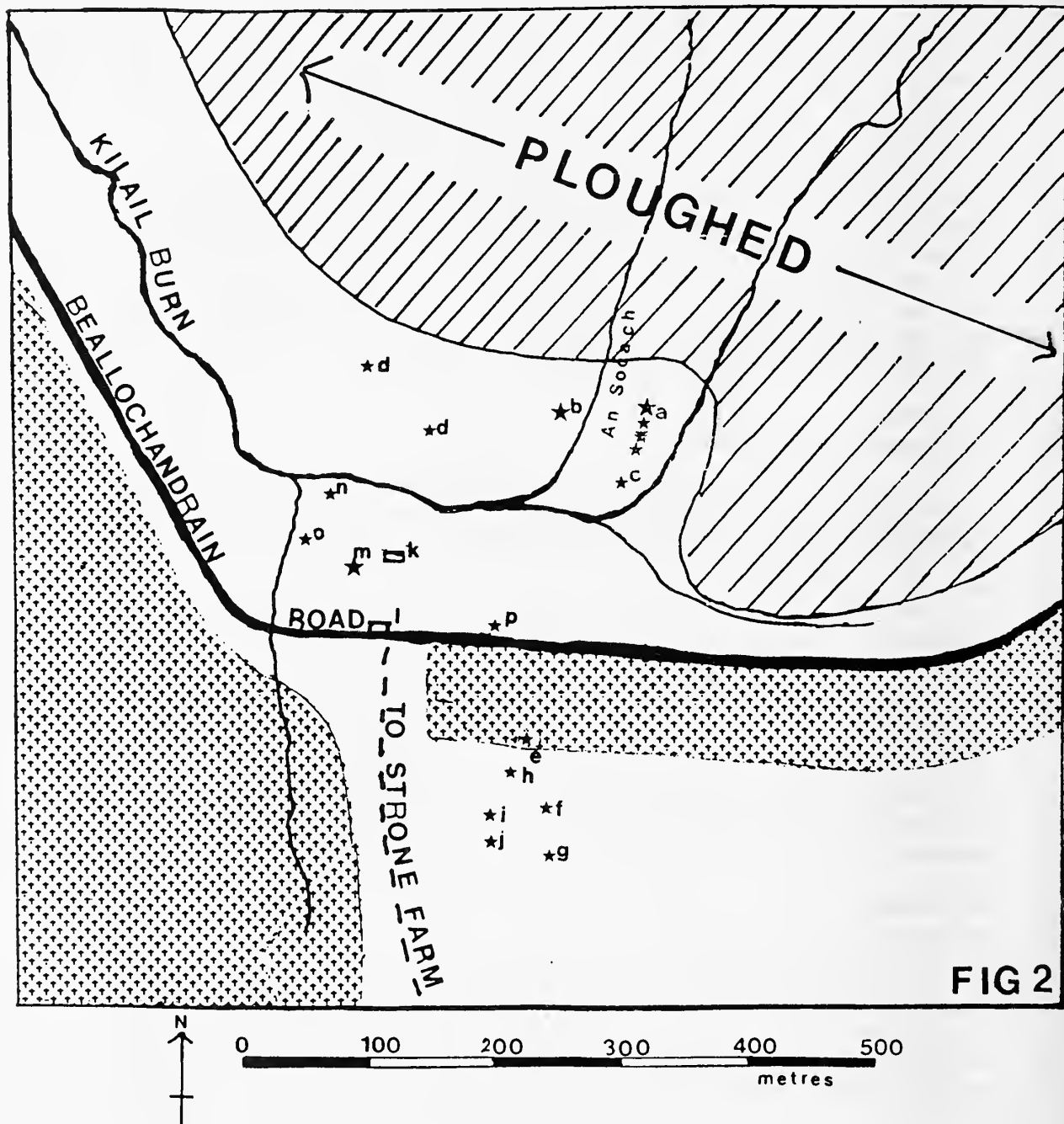


FIG 2

Junction of Strone Farm Road and Beallochandrain Road is at NR 9430 8340.

5.0 m x 4.0 m; internal measurement 2.0 m x 1.5 m; height of external bank 0.5 m; internal depth 0.5 m.

This pit was excavated - see report under Settlement on the Upper Kilail Burn, pit 'p' (Appendix 2). All this ground, except for the area around 'p', has now been ploughed for forestry (see Figure 2).

NR 948837 - One circular foundation, with central hollow. External diameter 6.0 m; internal diameter 2.0 m; height of external bank 0.6 m (broken on south-west arc).

NR 948839 - One near circular feature, with internal depression 5.0 m x 5.5 m.

NR 948839 - One oval foundation, with central hollow. External measurement 7.5 m x 5.0 m; internal diameter 2.0 m; internal depth 0.5 m.

NR 949839 - An oval foundation, or two circular pits side by side. Overall diameter 9.0 m x 6.0 m; internal depth, 2.0 m x 1.0 m and 2.0 m x 2.0 m.

NR 950839 - One circular feature. Overall diameter 4.0 m; internal depth 1.5 m.

NR 951838 - Three features:

1. An oval with stone footings; 8.0 m x 5.8 m.
2. Circle. External diameter 4.6 m; internal diameter 1.6 m; height of external bank 0.6 m; depth 0.25 m.
3. Near circle. Externally 6.0 m x 5.6 m; height of external bank 1.0 m; depth 0.2 m.

NR 955861

Largiemore, Otter Ferry.

On the area known as 'An Socach', 1.0 m east of Largiemore, to the south and south-west of a 'Homestead' there are various stony structures. Some of these are described as round, and range between 2.0 m and 4.0 m in diameter. An assessment cannot be made of them without a further visit, but the possibility is that they are circular depressions.

NR 975912

Lepinchapel, Loch Fyne.

The undernoted features were all discovered in the Lepinchapel area during the search for Recessed Platforms.

- NR 714911 - Circular depression, covered with heather. External diameter 5.0 m; internal depth 4.0 m.
- NR 714912 - Double circular depression, grassed over, with north-west end standing proud above moor. Internal measurement 4.0 m x 2.0 m.
- NR 714913 - Circular hollow, on green mound above moor. Internal diameter 2.0 m; enclosing bank 1.5 m broad; internal depth 0.75 m.
- NR 970909 - Circular depression. Internal diameter 1.5 m.
- NR 970910 - Round pit. External diameter 4.0 m; internal diameter 2.5 m; internal depth 0.5 m.
- NR 971911 - A small circular depression forms a small Recessed Platform. (Also see Poll Burn, NN 10530575).
- NR 972909 - Circular hollow. Internal diameter 2.5 m; enclosing bank 1.5 m broad; internal depth 0.4 m.
- NR 972912 - Circular depression. External diameter 6.5 m; internal diameter 2.5 m; internal depth 0.5 m.
- NR 973911 - Turf and stone circle. Internal diameter 2.0 m; enclosing bank 1.0 m broad.
- NR 974914 - Circular hollow cut into surface of a Recessed Platform.
- NR 974916 - Circular hollow cut into surface of a Recessed Platform. Internal diameter 1.0 m.
- NR 976914 - Destroyed by road; a Recessed Platform with an adjoining rectangular annexe. Between the two there is a circular pit.
- NR 976916 - Circular hollow. Internal diameter 2.5 m.
- NR 977912 - Circular depression. Internal diameter 2.0 m.
- NR 978914 - Double round depression. (a) Externally 3.0 m x 2.0 m, internal depth 1.0 m. (b) Externally 4.0 m, internal depth 0.5 m.
- NR 977915 - Round depression.

NR 991854

Camquhart, Glendaruel.

At about 75 m distance a variety of turf structures were noted before afforestation.

1. A sub-rectangular turf-walled structure, 8.5 m x 4.3 m.
2. Two circular turf structures, 3.5 m in diameter.
3. Two slag heaps.

NS. Cowal.

NS 003845

Lephinkill Cairn, Glendaruel.

Within 10 m of the forecourt of the above cairn, on the firm short grass which surrounds it, there is a circular depression. Memory makes it about 2.0 m in diameter internally, but it was not actually measured when noted. Now the ground is under afforestation, and although the cairn has been preserved the features are lost in deep heather.

NS 014786

Feorline, Colintrave.

Amongst the Recessed Platforms on this hill there is a circular depression, 1.5 m in diameter internally. It has no visible encircling mound.

NS 032969

Feorline, Strathlachlan.

On the west side of the B 8000 road, opposite the house 'Sunfield', there is a mound of slag which shows from the road as a green hillock on the crest of the moor. The slag mound is large and is set beside a small burn; the surrounding area is grassy and dry for a considerable distance.

Four metres north of the slag, in the grassy ground there is a circular depression, 1.2 m in diameter, slightly embanked and overall stretching to 4.0 m diameter.

This pit was also excavated; see report on Sunfield Pit in Appendix 2.

NS 063994

Stuckreoch, Loch Fyne.

This area was mentioned particularly by Macadam (1887: 97) as having a very large bloomery. There are now forestry developments on both sides of the burn - young forest to the north and mature forest to the south - but grazing animals are off the land and the grass and undergrowth is rank and heavy, thus masking the features in the ground.

At least one circular pit was found, and other possible pits were considered but were not clear enough to be recorded. Two pieces of slag were taken from a building construction waste heap. The circular depression noted was 4.5 m overall, and 2.0 m internally.

**NS 122974**

Tom a' Choraghasich, Strachur.

On the west side of the A815 road, across from the Lauder Memorial at Invernoaden, Strachur, there is one definite circular depression and probably another two which are less obvious on the ground. The authentic one is 2.25 m in diameter and has clearly visible edges. The pit is filled with oak leaves, since the knoll supports a stand of oaks which have not been coppiced.

The pit on Tom a' Choraghasich was excavated, and was found to be a charcoal pit (see report in Appendix 2).

**NS 125972**

North of Loch Eck.

On a knoll nearer Loch Eck, on the same side of the A815 road, there is another possible depression, also 2.25 m in diameter.

**NS 165790**

Ardnadam/Dunloskin, Dunoon.

The undernoted features were noted in the Ardnadam/Dunloskin area during the survey of Recessed Platforms.

NS 159789 - Circular depression in moorland. Internal diameter 2.0 m; internal depth 0.25 m.

NS 160786 - Circular depression, adjacent to turf foundation. External diameter 4.0 m; internal diameter 2.5 m; internal depth 0.25 m.

This pit and the turf structure were both excavated; see reports on Eas a' Chaibeil, Dunloskin in Appendix 2.

NS 160796 - Circular hollow, on an apparent boss of rock. Internal diameter 2.0 m; internal depth 0.3 m.

NS 161786 - Circular depression, above a stone revetment adjacent to burn; second depression of same size 20 m to south under a fence. Internal diameter 1.5 m; internal depth 0.20 m.



NS 161788 - Circular depression, with small hollow contiguous, on moorland. Internal diameter 2.0 m; internal depth 0.25 m; small hollow, diameter 0.6 m.

NS 163789 - Slag heap.

NS 163790 - Circular hollow, in wood, on spur between old water course and present bed of burn. Internal diameter 2.0 m; internal depth 0.5 m.

This pit has also been excavated; see report on Dunloskin Pit in Appendix 2.

NS 163791 - Slag heap.

NS 164744 - Slag heap.

NS 164789 - Circular hollow, in wood. This hollow cannot now be located. Internal diameter 3.0 m; internal depth 0.3 m.

NS 165780 - Slag heap.

NS 165788 - Slag heap.

#### NS 176905

Craighoyle Woods, Glen Finart.

A round depression, 1.5 m in diameter, was noted in a clearing in the oak woods. Other possible depressions were seen, but since the bracken masked the ground they were not clear enough to be recorded.

#### NM. Morven; Appin.

#### NM 6792 5217

Arienas Woods, Morven.

An extensive group of platforms was visited here, although a detailed survey was not made. Many features apart from platforms were found, including foundations of houses, huts, kilns, etc.

Many circular depressions were seen, although not recorded. However, the position of one pit was marked at NM 67925217. It was circular, shouldered, 1.5 m in diameter, and 0.5 m deep. The soil was very black and contained fragments of charcoal.

#### NM 755620

Arderly, Loch Sunart.

The undernoted circular depressions were recorded in the Loch Sunart area during the survey of Recessed Platforms.

NM 75286235 - 3.0 m diameter; hollow 0.3 m deep.



- NN 007270 - Two circular hollows; 1.5 m in diameter.
- NN 008271 - Circular hollow; 2.5 m in diameter.
- NN 008296 - Circular hollow; 3.0 m in diameter; surrounding banking 0.25 m high.
- NN 008298 - Two or three circular hollows. All c.1.5 m in diameter.
- NN 010267 - Circular shouldered pit of 5.0 m, below front scarp of a platform.
- NN 013269 - Shouldered circular hollow.
- NN 013269 - Circular hollow; 2.0 m in diameter; embanked on downhill slope.
- NN 016274 - Well-formed circular depression. External diameter 2.5 m; internal depth 0.3 m; crest 0.3 m deep.
- NN 016276 - Circular pit; embanked; centre tapering. Internal diameter 2.5 m; internal depth 0.75 m; diameter of base of pit 0.5 m.
- NN 017274 - Circular hollow; 2.0 m in diameter. Embanked on downhill slope. Adjacent to stone-lined irregular depression, about 3.0 m x 2.0 m, and a trail of embedded boulders.
- NN 017274 - Circular hollow, with tree growing from centre. External diameter 3.0 m; internal depth 0.5 m.
- NN 017277 - Very large circular depressed area filled with water. About 6.0 m in diameter. Other large depressions were adjacent, all 'dished' (not flat).
- NN 018274 - Circular depression dug into a possible platform, into which another platform is recessed. Internal diameter 2.0 metres.

**NN 097045****Creggans, Loch Fyne.**

When searching the hill between Creggans and Poll for platforms, many circular depressions were seen but not recorded. Memory places them in the northern section of the site, and on the higher area of the site above the mature forestry where more depressions were seen.

On one platform (NN 098042) there is a spill of iron slag across and over the edge of the lip. This area is now ploughed and afforested, and although the platform and slag can still be found, with some difficulty, the depressions will be masked by vegetation.

## NN 104024

## Inverglen, Strachur.

About 400 m north-east and above Inverglen Farm, there is a large turf-house foundation. Adjacent to the house is a mound containing a hollow; height c.0.75 m and diameter 3.0 m.

Some 20 m downhill there is another flat-topped mound, with slight 'dishing' on the top.

## NN 106058

## Poll Burn, Loch Fyne.

This may be the extensive bloomery site with many charcoal hearths mentioned by Macadam (1887: 97). On both sides of the burn, as far as Ardchylene Farm, many round depressions were found, although no slag heaps were evident. Other possible pits were noted beside the burn.

NN 10500580 - On crest of hill and 100 m from side of burn; circular depression which has been excavated. External diameter 8.7 m; internal diameter 2.5 m. Excavation report under Ardchylene in Appendix 2.

NN 10530575 - About 50 m from side of burn, and recessed into bank; circular depression. Overall diameter 6.0 m; internal diameter 1.6 m.

NN 10550570 - On south side of burn; circular depression. External diameter 5.5 m; internal diameter 2.0 m.

NN 10750580 - On north side of burn; circular depression. External diameter 5.5 m; internal diameter 2.0 m.

NN 10750580 - Circular depression. External diameter 4.5 m; internal diameter 2.0 m.

NN 10850590 - On north side of burn; circular depression. External diameter 6.5 m; internal diameter 2.0 m.

NN 10900580 - On south side of burn; circular depression. External diameter 7.0 m; internal diameter 3.0 m.

NN 10980595 - A circular hollow cut into the front lip of a platform. Charcoal was visible in the hollow and in the edge of the front lip at the same level.

## NN 160690

## Glen Nevis.

The undernoted circular depressions were recorded during the survey of Recessed Platforms.

- NN 157680 - Circular hollow in floor of platform.
- NN 157682 - Circular hollow in surface of platform. External diameter 3.5 m; internal diameter 1.5 m.
- NN 157682 - 4.0 m below and to the east; a circular hollow, with a stone edge on downhill slope. Internal diameter 2.0 m.
- NN 158681 - Circular hollow, in west side of the surface of a platform.
- NN 158681 - Circular structure, recessed into hill; back stands 1.0 m high and is revetted with stone. External diameter 3.5 m; internal diameter 2.5 m; front bank 0.6 m broad.
- NN 161693 - Circular hollow. Internal diameter 1.0 m.
- NN 164684 - Circular hollow in floor of a turf enclosure.
- NN 164685 - Circular hollow adjacent to an oval enclosure.
- NN ----- - Circular pit.

#### NG. Loch Maree (north).

A visit was made to the area of the Red Smiddy, at the north end of Loch Maree, to see what evidence remained of the Iron Furnace and associated charcoal-making activities commenced in the 17th century. Dixon (1886) considered the Red Smiddy to be the last of the Iron Furnaces to operate.

#### NG 865794

##### Red Smiddy.

At the area mentioned by Dixon (1886), "half a mile above the Red Smiddy", a half-moon shaped area was found to be enclosed by a stone dyke. Within the enclosure there were the following features:

- a. Evidence of a settlement.
- b. Three levelled 'scoops' (with diameters of 10 m, 8.0 m and 8.0 m) recessed into the hillside, thus suggesting that the area had been roughly cut out of the hillside to increase the levelled area.
- c. A flat area between the settlement and the scoops.
- d. A rectangular trench, 12 m long by 2.0 m wide.

#### NG 869785

##### Red Smiddy.

Several round depressions were noted, below and to the south of a flattened knoll. All were about 1.5 m to 2.0 m in

diameter. One was very evident; it was 0.5 m deep and was shouldered.

**NG 871788**

**Red Smiddy.**

Half a mile further south-west, on a peninsula which forms the north-west point between the river and a deep bay, a group of pits were recorded, as follows:

- a. Circular. 2.5 m diameter externally; 0.7 m deep; tapering to 0.75 m at bottom; moss-covered.
- b. Circular. 2.0 m in diameter; 0.3 m deep.
- c. Circular. 2.5 m in diameter; 0.3 m deep; moss-covered, no stones evident.
- d. Circular, but not well defined. Approximately 2.0 m in diameter.
- e. Circular, but not well defined. Approximately 2.0 m in diameter.

(a, d and e are all on a flattened circular area).

- f. Rectangular. 5.0 m long and 0.5 m wide; north-west end closed and rounded; south-east end open.
- g. Rectangular, but doubtful.
- h. Rectangular. 6.0 m long; 1.0 m wide; 0.3 m deep at north-west end; fades out at bottom end.

(c, f, g and h are all on a ridge falling away south-west to north-east).

- k. l. and m. These are three other possible circular pits, each about 2.0 m in diameter and set nearer to the point of the peninsula.

**NG 872784**

**Red Smiddy.**

A pit cut into the hillside; 1.5 m in diameter and 0.5 m deep. There was a cut through the side on the downhill slope facing north.

**NH. Loch Maree (south).**

A visit was also made to Fasagh, at the south end of Loch Maree, where Dixon (1886) believed the first of the industrial iron workings might have started. Dixon said that, north of the

River Fasagh and the Iron Works, there was evidence of extensive charcoal burning (1886: 91).

**NH 010655****Fasagh.**

The area was found to be heavily covered by peat and heather, and in some areas was very wet - even flooded. Towards the east of the triangular area between the sheepfold, the river and the fence, many 'islands' amongst the heather were noted to be covered by grass and bracken. These were either circular, oval shaped, or mounded, and stood about 1.0 m high.

- a. The circular features were between 2.5 m and 3.0 m in diameter, and were slightly dished; about six were noted.
- b. The oval features were larger, about 9.0 m by 6.0 m. Each could be described as two parallel or converging rectangular pits with a mound between them. Four were noted, and one was clearly defined.
- c. The mounds were about 3.0 m by 2.0 m at base, stood 1.0 m high, and were shapeless, since the top was covered with bracken. No stones were evident, and the mounds seemed soft.

**NH 015654****Fasagh.**

In the trees on the south-east side across the bay from Fasagh, a group of pits and one possible trench was noted.

- a. In a grassy area just above the track on the north side of the Dubh Chlais burn, there is the foundation of an oval house and one pit. The pit is 2.0 m in diameter and 1.0 m deep.
- b. 100 m east, in the trees and above the burn, two round depressions are cut into the hill slope. One is 2.0 m diameter, and the other 2.0 m by 1.5 m.
- c. On the south side of burn, cut into the hill slope opposite b, there is another round depression, 2.0 m in diameter, 0.3 m deep, and built up on the downhill side.
- d. Below and nearer the burn there is a possible trench, not well defined, measuring 3.5 m by 1.0 m, with the suggestion of a shoulder; soft in the centre.

**NH 015653****Fasagh.**

On the south side of the trees there are two raised areas, one above the other, cut into the hill.

- a. Built up with earth and stone to form a ledge 0.5 m high. On the surface, and cut into the hill-slope, are two round depressions, 3.0 m overall and 1.5 m broad. The depressions are very shallow.
- b. The second raised area, 2.0 m above, is a circular dished ledge with large tree growing out of uphill side; 2.0 m x 1.5 metres.

**NH 028635****Fasagh.**

On the south bank of the burn, at a ford and beside the track, there is one and possibly two circular depressions with stone setting around edge.

**SE. Levisham Moor, North Yorkshire.**

The following sites at Levisham Moor, North Yorkshire, are also described here, since although they are in an area completely different from those already visited, the features are similar to those already recorded. The information has been supplied by Mr. R.C. Callander and Mrs Margaret Smith, from a visit to the area in March 1991.

**SE 83709185****Dundale Griff (425 feet).**

On the south side of a stream, in a narrow steep-sided valley, there is a scooped platform. Overall the platform, which is more of an apron than a scoop, measures 6.5 m north-west to south-east along the contour, by 4.5 m transversely. The scoop is about 1.0 m high, and slopes at an angle of about 45°. The front, which slopes down to the stream, is at least 1.0 m high, and slopes at a similar angle. There is little evidence of stone on or around the grass-covered platform, but much evidence of charcoal.

**SE 83869175****Levisham Beck (375 feet).**

A short distance downstream, on the same side there is a 13th/14th century iron-working site with much slag, and traces of the grass-covered founds of a small rectangular structure.



**SE 841831**

**Horness Ridge (550 feet).**

On the steep north-east facing slopes, in and below patchy scrub woods on the west side of the valley of the Levisham Beck, about 1.6 km upstream from the iron-working site, there are several small charcoal-burning sites, identifiable by the quantity of charcoal present, which seemed to be hollow-centred or like a pit.

Typical was the one measured, which was a pit about 2.5 m in diameter, with a present depth of 0.4 m. Upslope, the edge is a bank about 0.3 m high and 1.0 m thick, which contains much charcoal.

**SE 842935**

**Hole of Hocum (600 feet).**

Near the floor of the steep heather-covered slopes of a short wide valley on the west side of Levisham Beck, about 2.0 km from the iron-working site, is a charcoal-burning pit. Measuring about 3.0 m to 3.5 m in diameter, within a bank about 0.4 m high and 1.0 to 1.5 m thick, its depth is about 1.0 m below the bank top. There is much charcoal in the pit and in the bank, particularly that on the downslope. No other such sites were visible nearby.

Further upstream on the west side of the valley, near its head, there are apparently further similar charcoal-burning sites.

## Appendix 2

Nine hollows have been excavated or partially excavated and the information acquired can be summarised as follows:

(a) Heat had been generated in six of the pits which were opened (Nos. 1-6).

(b) All the pits were clay lined.

(c) The soil removed from pits Nos. 1 - 6 carried a high percentage of charcoal.

(d) There was a quantity of charcoal gathered on the external edge of pit No. 4, thus suggesting a sack-filling area.

(e) Most pits were closely associated with bloomeries, and in two pits slag was taken from different levels (Nos. 2 and 9).

(f) The dimensions of all the hollows were in agreement with the dimensions given by both Macadam (1886) and Logan (1976) for pits in which charcoal was made.

(g) Graham's description of a pit dwelling (1918) equates well with the pits which have been opened, and is more likely to have been for the making of charcoal.

(h) Pits 'n', 'o' and 'p' on the Upper Kilail Burn may have been used for the making of peat charcoal.

The conclusion drawn from all these excavations is that it is extremely probable that these pits were dug and used by the local people for making their own supply of domestic charcoal. It is likely that these particular examples are not very old, since the circular hollows remaining in the ground would probably cease to be visible after one or two hundred years. The pit at Sunfield was shown by the pottery to have been opened in the mid-19th century.

It follows that many of the circular hollows recorded, and the many others seen but not recorded, may also have been charcoal-making pits. As they filled, either from use or from abandonment, they may have become 'pitsteads' and would be almost impossible to locate.

It is to be noted that two hollows were investigated which proved negative. One was the junction of two field drains, and the other was simply a shallow hollow whose use could not be explained. It therefore follows that every circular hollow is not necessarily a charcoal-pit.

## 1. Sunfield Charcoal Pit. NS 03279720.

### Excavation

The Sunfield complex comprises an elongated slag heap, which inevitably conceals a forge, and, a short distance to the east, a shallow pit surrounded by a bank with, some two metres away, a discontinuous outer bank; Figure 3 (without the slag heap).

All features lie north of Sunfield, and to the north of the B8000 road. The site of the pit was excavated by Mr. Frank Newall, Mr Harry Sinclair and Mr. G. McGarvie on 7.6.89, the trench being laid out with an extension to cut the outer bank on the north (see Figure 3).

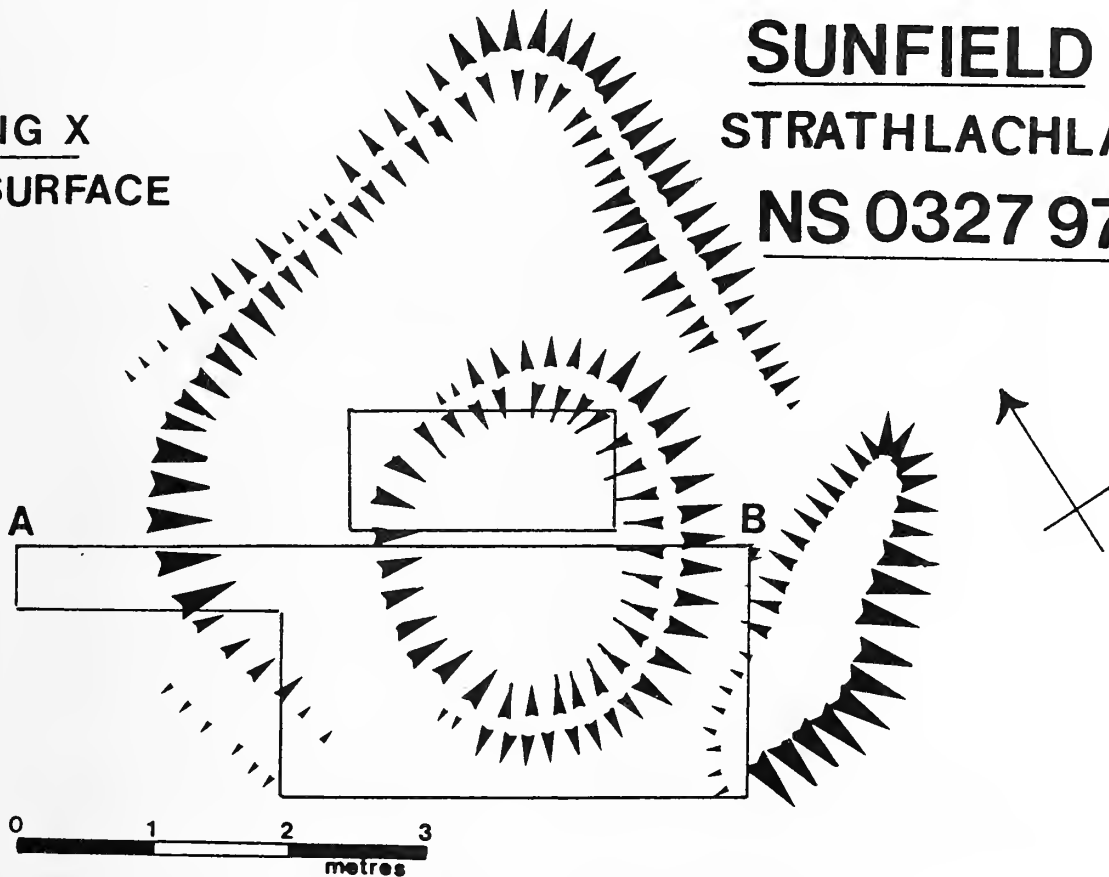
A humus, at maximum 6.0 cm thick, comprises an upper dark peaty layer, 2.0 to 3.0 cm thick, over a more developed yellowish-brown clayey soil. From this, just north of the pit,

# SUNFIELD

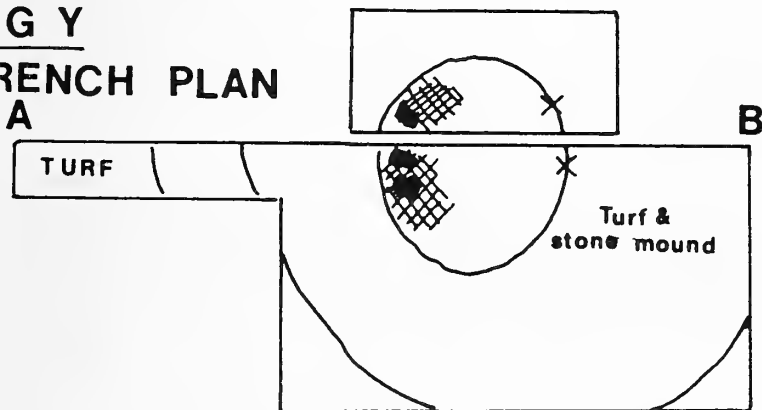
## STRATHLACHLAN




### NS 0327 9720

**FIG X**  
**SURFACE**

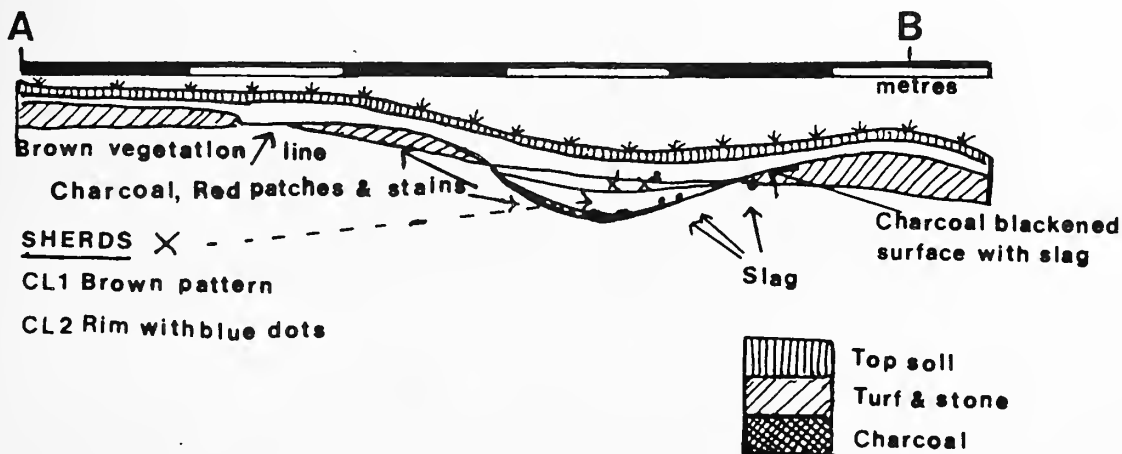


**FIG Y**  
**TRENCH PLAN**



-  Charcoal
-  Reddened subsoil
-  SLAG pressed into surface of mound

**FIG Z SECTION A-B**



**FIG 3**

came a sherd of 'modern' white table ware, and a convex reddish-brown tinged body sherd.

The pit, apparently 2.5 m wide at the surface, was originally, as dug into the orange-yellow subsoil, about 1.5 to 1.8 m across, being slightly oval, and 0.25 m deep at the centre. The depth was increased to 0.45 m by the addition of the stony turf-like bank around the edge of the pit. This was laid directly on the subsoil.

By contrast, the cut, through the outer bank to the north, showed that it had been laid on a thin brown vegetation layer. The bank itself was of turfs thrown together, as the disjointed brown vegetation lines showed, but over it a developed black grass line, confined to this one locality, suggested that the final turfs were deliberately laid grass side up.

The evidence points to the site having been cleared of turf before the pit was dug, the cut turfs forming the outer bank. The pit was then dug into the subsoil, and the inner bank piled round it, but despite this increased width and depth, all evidence of use came from the lower subsoil walled bowl, and was preserved in the lowest fill of the pit, some 10 cm thick at centre.

At the bottom, there was 1.5 cm of very black charcoal-flecked soil. Spreading down only the north side of the pit, and passing into this, was a layer of compact charcoal fragments. Beneath this the subsoil was reddened patchily in three places. Nowhere else round the side of the bowl did charcoal or evidence of burning survive.

However, some 2.0 cm above the bottom layer, a second layer of charcoal spread down the north side towards the centre of the pit. Above this, the lower fill was of dark charcoal-flecked earth, reddish tinged, and with distinct red staining near the centre at the top.

### Conclusions

It was concluded that this was due to silting with wash of charcoal and burnt earth from the sides of the pit, except on the north. Consequently, it may well be that further charcoal burnings took place, which have left no traces except in the staining of this fill; otherwise it is difficult to account for the red staining. Significantly this layer contained about a dozen pieces of slag around the south rim of the pit, and numerous pieces were trodden into the surface of the bank itself in a thick charcoal-blackened layer.

Most significantly, from the bottom layer between the

charcoal bank came two pieces of slag. This clearly indicates the relationship between the pit and forge, establishing that slag had been produced between periods of charcoal manufacture.

The top fill of the pit was a soft brown earth. From the bottom of this, above the darker industrial fill, came a sherd of 'modern' white table ware, brown patterned, and slightly higher up, a rim sherd with a blue dot (Figure 3, Nos. 1 and 2). To judge from the depth of formation over the pit, it would appear to be at least 350-400 years since it fell out of use. It was guessed that it was some 250-300 years since the sherds were dropped, but in September 1989 the two sherds were sent to the ceramics department of Kelvingrove Museum for assessment. A report given by Miss Patricia Collins, Assistant Keeper, states that "It is extremely unlikely that the sherds date from 250-300 years ago as mentioned in the report. The very earliest date, I would suggest, would be c. 1820".

#### **Acknowledgements**

To Mr. Frank Newall, Mr. Harry Sinclair and Mr. G. McGarvie for carrying out this excavation, and for demonstrating that the pit beside the bloomery was indeed a 'pitstead' for the making of charcoal. Also to Lady McLachlan of Castle Lachlan for allowing the excavation to take place on her land.

## **2. Tom a' Choraghasich Charcoal Pit. NS 122974.**

#### **Excavation**

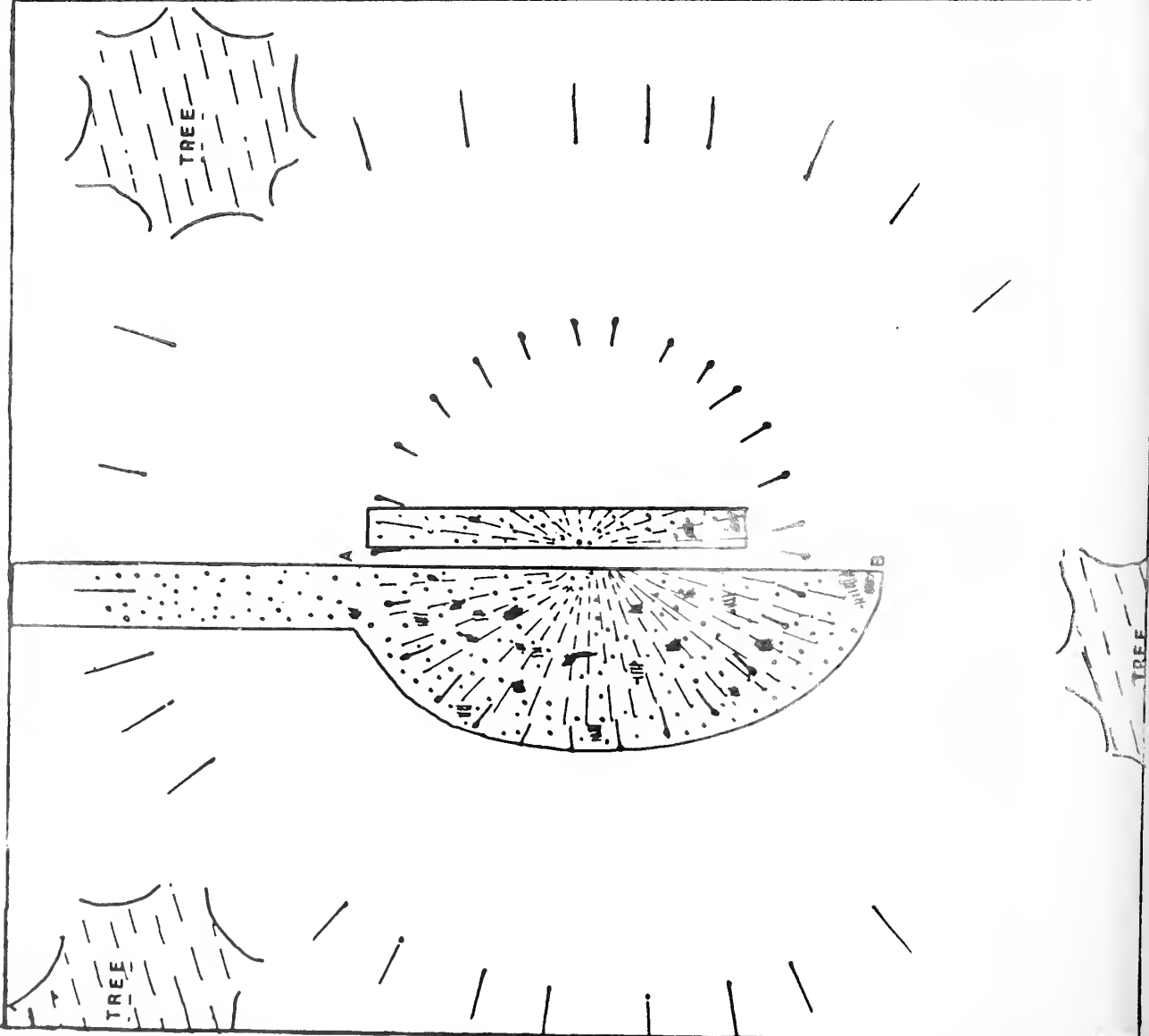
The pit on Tom a' Choraghasich is close to the summit of a wooded knoll. The oak trees around are not coppiced and are judged to be about 100 years old. On the same knoll, within a radius of about 50 m, there are two, or possibly three, other circular pits.

The pit which was excavated (on 1.12.90) was clearly visible, since it held a covering of oak leaves lying in the depression. The hollow was 3.0 m in diameter, 0.15 m deep, and was set with a low encircling bank of about 1.5 m in width.

On excavation, black earth laden with charcoal was found to fill the depression. It was found immediately under the turf. A spread of clay curved round the edge of the hollow enclosing the black earth. In the extended trench, stretching to the north the clay was found to spread over the encircling bank, and where the ground slope fell away at the north end the clay ceased, giving way to brown loamy soil.

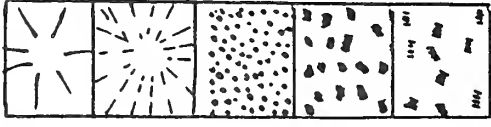
PIT on TOM A' CHORAGHASICH

NS122974



N ↑

SECTION  
ACROSS  
A-B



PIT AS VISIBLE IN  
TURF

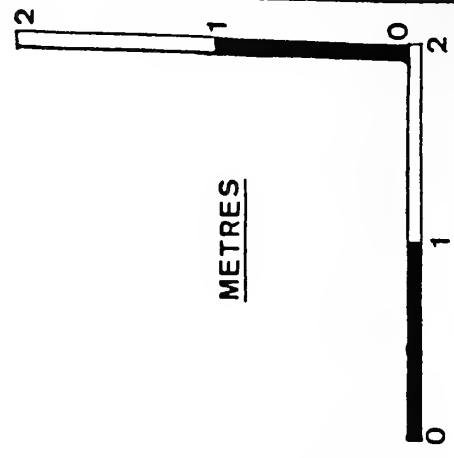
PIT IN TRENCH

CLAY

INTENSE BLACK

REDDENING

METRES



**FIG 4**

Removal of the charcoal-impregnated soil showed that the clay edge continued downwards at a steep slope, forming a deep clay-lined bowl with a clay-lined base. The bowl was approximately 1.0 m deep and 3.0 m in diameter. In many places, particularly at the top of the south side, the clay showed evidence of having suffered great heat. It was reddened and baked hard. The fill appeared to consist of layers of black soil alternating with layers of dirty black clay, which sometimes was reddened and baked. The layering was most evident in section, although even during the removal of the fill the levels could be noted. One band of reddening could be traced in the baulk section, and occurred again in the side of the pit. (See Figure 4).

Two pounds of the black charcoal-laden soil were water-sieved, and this yielded eight ounces of charcoal, i.e. 25% of the soil consisted of charcoal.

### Conclusions

This pit appears to have been dug and used for the purpose of making charcoal. The pit was lined with clay, which seems to have been spread beyond the limit of the actual hole to form the mound which surrounded it.

The pit must have been used on many occasions, and sometimes may have had a new but thinner base of clay laid down before it was re-used. As the final charring process was so near to the present turf line, it is probable that the last burn took place not much more than 100 years ago. By that time the pit may have been nearly filled, and the last charring pyre set on a nearly flat surface.

### Acknowledgements

To Mr. W. Montgomery for permission to dig on his land, and to Mr. Frank Newall, Mr. Harry Sinclair, and Mr. A. Garner, for help with the excavation.

### 3. Head Water of Eas a' Chaibeil (Dunloskin). NS 16007860.

#### Excavation

About 500 m west-north-west of the summit of Dunan the burn Eas a' Chaibeil has changed its course, leaving a dry valley with banks on each side. The north bank now forms a promontory, which lies south-west to north-east and drops very steeply to the south-east. The north-east point and the north-west side are less precipitous. On the crest of this promontory there are two oval turf foundations, each about 10 m

x 7.0 m, and each of which lies with its long axis along the spine of the promontory. On the more gently sloping north-east end, a circular pit has been cut into the ground. The hollow is about 0.25 m deep and 1.5 m in diameter. The rim is about 1.0 m broad, but is not raised nor visibly set with stone.

In 1981 the ground was ploughed and afforested, but the planted area terminated on the promontory. Both the oval foundations were ploughed through, but only the more westerly was planted over. In 1989 that foundation could not be found. Since the more easterly had been sectioned centrally by the plough and was standing open, the opportunity was taken in 1981 to investigate the remains. The structure was found to have wall footings one course thick, which were packed with clay. The floor also was clay packed, and on top there was a 10 cm layer of greasy charcoal-flecked soil. Centrally a hearth had been used, built of flat paving. It was surrounded by a thick deposit of large pieces of charcoal and very black soil. Near to the hearth was a flat-topped boulder, about 30 cm wide and 20 cm in height. (See Figure 6).

In April 1989 the round depression 6.0 m north-east of the oval foundation was also investigated. A trench 1.0 m wide was cut through the down-slope side of the hollow. A second trench nearly 1.5 m wide was then cut adjoining the first one, across the north-east lip and down the hillslope. Under the turf and bracken roots, there was firstly, in the pit, a deposit of light-coloured clay-silt, which overlay a band of dark, fibrous, peaty material. In the adjoining trench, under the north-east rim and the sloping ground beyond, there was no silt deposit, but the dark fibrous material was present. In both the pit and the external trench the peat gradually became more and more impregnated with charcoal.

In the lower trench the fill became a spread of compacted charcoal dust, with small shiny fragments of charcoal. This layer was found to be between 10 and 15 cm thick. Within the black material there were patches of compressed light-coloured mud or clay. Under the charcoal and mud spread, the natural brown loam of the hillside was found.

Within the pit, the change from peat to a mixture of charcoal and black earth was more gradual. As the charcoal fragments became more numerous, stones were also found in the fill. Finally, within about 10 cm of the bottom and again on the bottom, there was a prolific scatter of charcoal, blackened patches, reddened patches and levels of small stones, which showed evidence of heat and burning. The stones were mostly fist-sized and appeared to have been roughly set, forming two 'floors'. On the lower floor there was a slab, about 1.0 m



wide, which showed evidence of heat; it was reddened and stained and belonged to the top floor. This top level was sectioned from north-east to south-west, to discover the composition and depth of the material below. The composition was the same as the top level, i.e. charcoal, black earth, patches of reddening, and all lying on another layer of broken stones. The flat slab lay on top of the lower level, but could not be removed since it was set under the baulk. The lower level was on natural soil, which was darkened and even reddened in parts. (See Figure 5).

Since the lower trench had cut away the front lip of the pit, the composition of the lip was uncovered. It was composed of natural brown soil, unburnt and unstained, and no stones were utilised at that area. In the north arc of the pit, a large naturally-curved boulder was set against the rim. It stood on the bottom floor but did not quite stretch to the surface of the rim. It had a flat top, and was firmly placed on a broad base. There were a few stones set into the south-east side which may have formed part of the side, but the excavation did not continue long enough to discover their use.

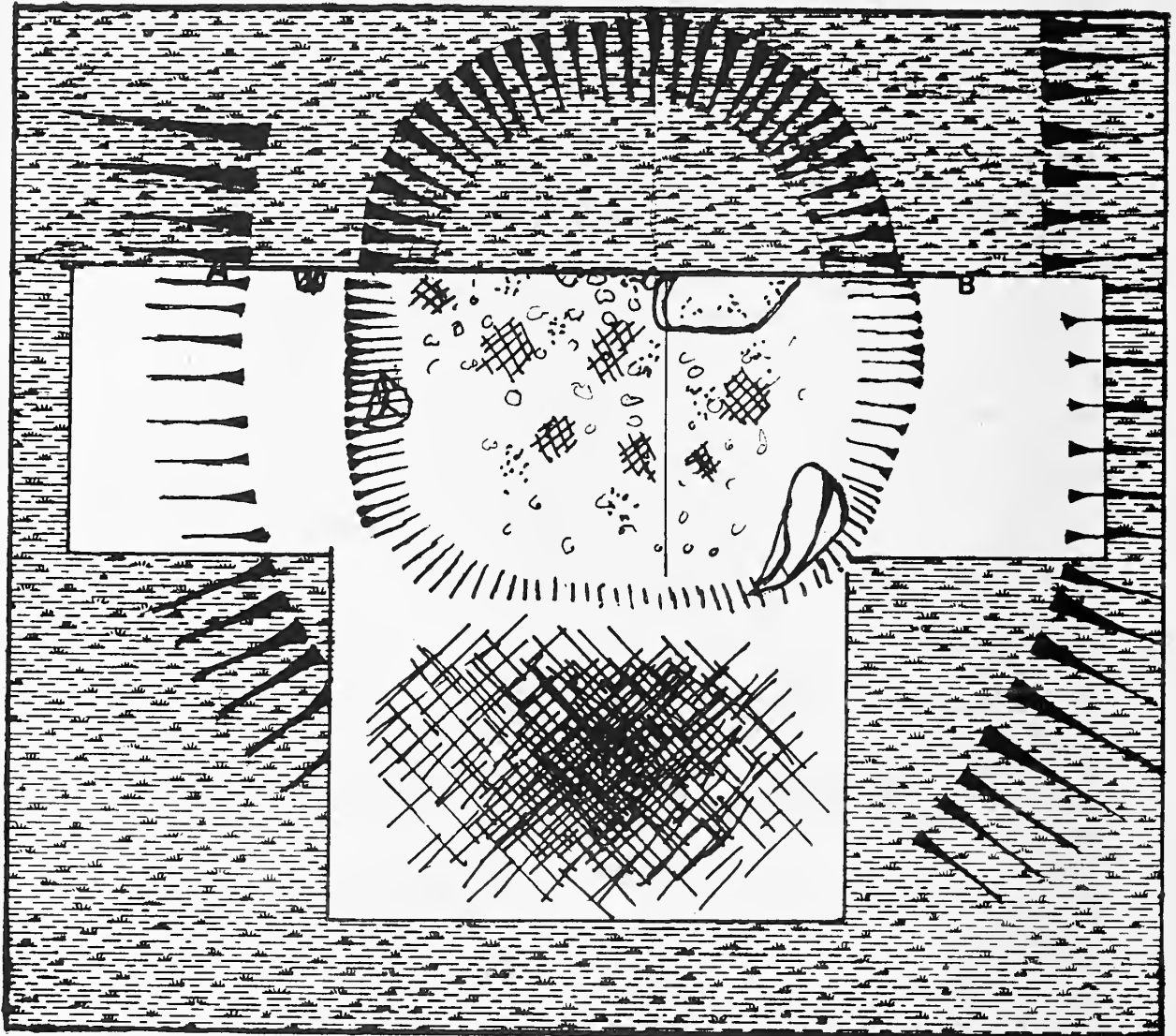
### Conclusions

The pit had contained fire on more than one occasion, since there were at least two levels of burning. Stones had twice been laid to make a working surface within the pit, and other dislodged stones on a higher level may have belonged to a destroyed level.

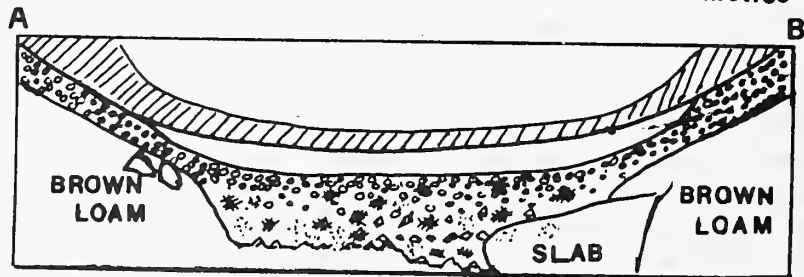
Only charcoal was found within the pit and a thick spread of charcoal was found outside, so it seems probable that the pit was used for the making of charcoal. It is most likely that the raw material was wood, since the natural soil in the sides of the pit was a woodland loam; also, pieces of small charred timber were collected which would not have been found in peat charcoal.

After each burn, when the charring process was completed the new charcoal was taken out and deposited on the ground to the north-east of the pit. From there it would be taken away, and the dust and tiny fragments left to form the black shiny spread which was uncovered. The compacted appearance of the charcoal dust, and the patches of mud, suggest that the area was tramped. The large boulder in the north corner of the pit was in the position which was the most vulnerable when the pit was being emptied. It is in the position in which a right-handed man would need to stand if he were shovelling charcoal from the pit on to the ground to his left.

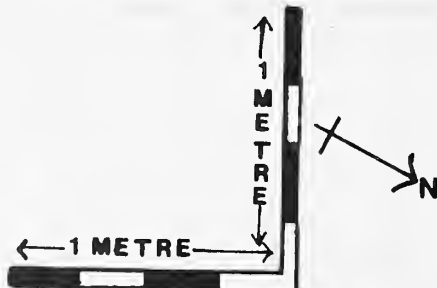
# PIT AT NS 1600 7860



1                      2                      3  
metres



- Top soil
- Peat
- Silt
- Charcoal
- Reddening



**FIG 5**

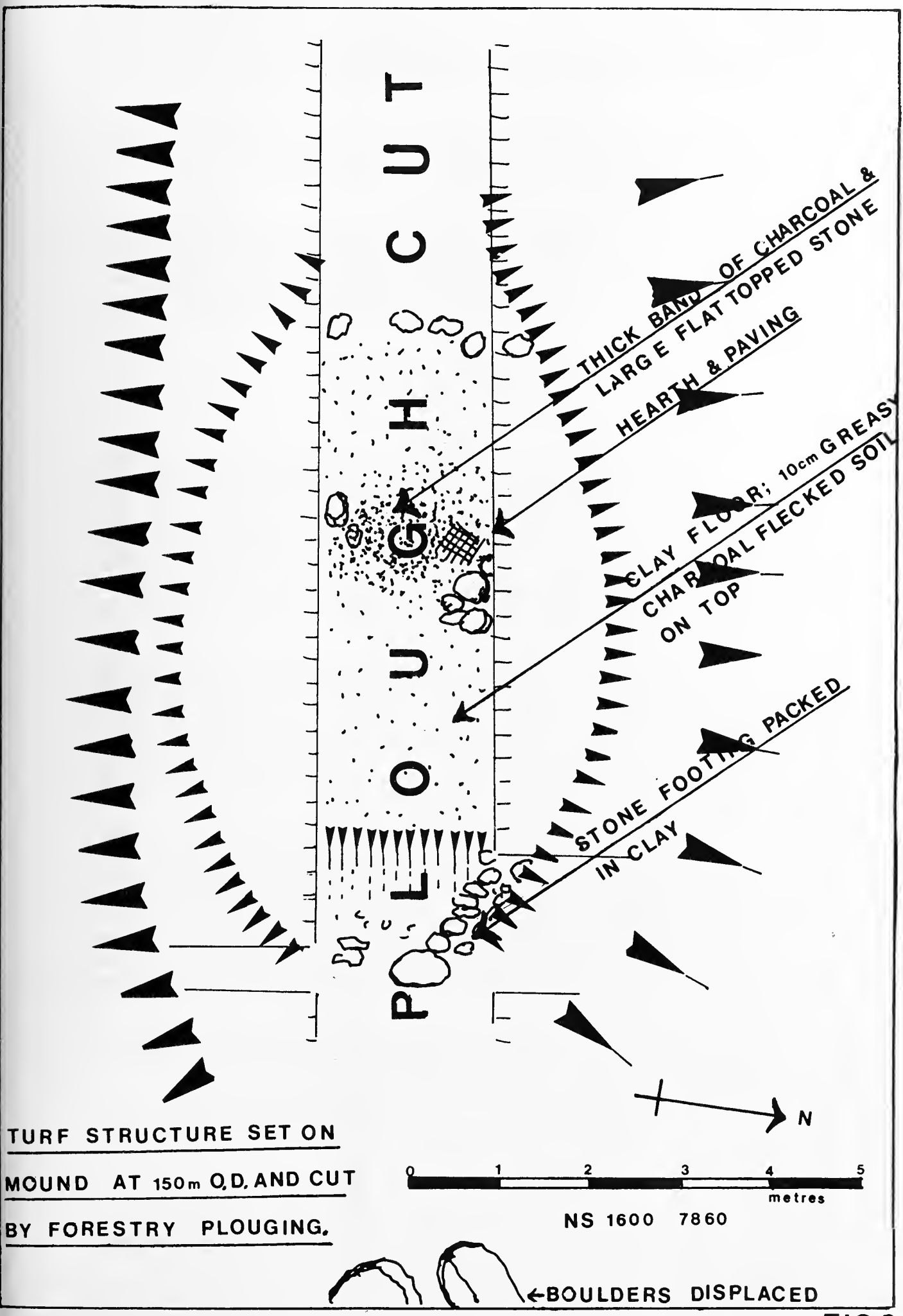


FIG6

It is just possible that the two oval foundations above and to the south-west of the pit are associated with it. They could be the Scottish version of a 'charcoal-burner's hut'.

#### Acknowledgements

To Mr. C. Blythe of Tilhill Forestry for permission to excavate both of these structures. Also to Miss D. Thomas, Mr. Frank Newall and Mr. Harry Sinclair for hard work, enthusiasm, and constant encouragement to continue with the programme of research.

#### 4. Ardchylne Charcoal Pit. NN 10500580.

##### Excavation

The pit which was excavated at Ardchylne (on 29.11.90) lies between the Poll Burn and the road, almost on the crest of the hill. In the same area, on both sides of the burn and in open woodland, there are six other authentic pits and a few possibles. One of the possibles is cut into a Recessed Platform. Encircled by the pits, on two knolls, there are stone foundations of two or three possible oval structures. The most valid lies 25 m north-west of the excavated pit, and measures 7.0 m by 3.0 m.

The excavated pit is set on open ground in a very wet area. The ground in which it is cut appears to have been built up slightly above ground level, creating a flat platform 7.5 m x 6.0 m. It is possible that the platform is formed of clay, since the excavation showed that clay spread out almost to the end of the west trench. Set into the clay there are two pits; one larger and deeper than the other. The larger, which was excavated, was filled with rushes.

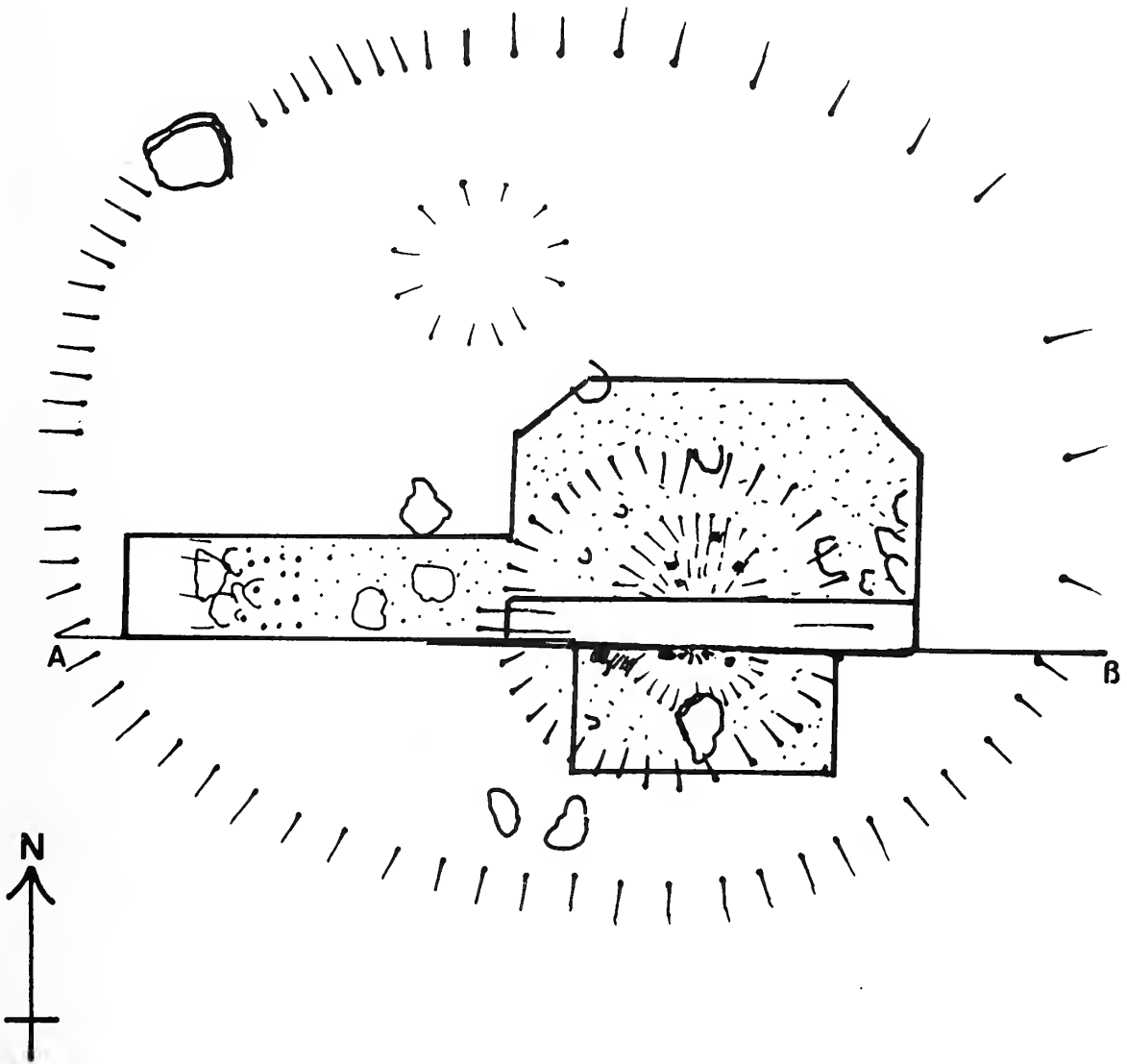
Immediately under the turf, the layer of clay was found. It surrounded the circular depression, which was filled with black soil heavily impregnated with charcoal. The black soil was contained in a pit about 0.8 m deep. The sides had some clay packing, but the clay was not as continuous as it was over the platform. The sides of the pit had patches of intense blackening, and some reddening. The blackening was also very evident in the clay spread in the trench to the west. (See Figure 7).

In the base of the pit there was a small hole, or even a socket, about 15 cm in width and the same in depth. It, and the base around it, were firmly coated with clay.

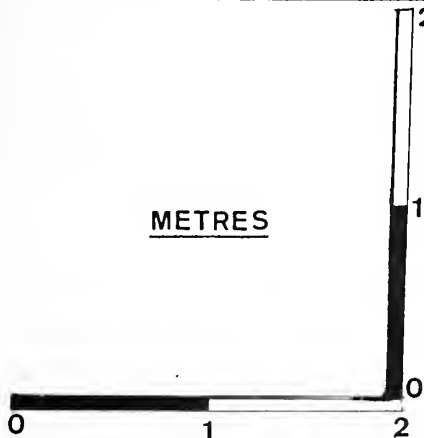
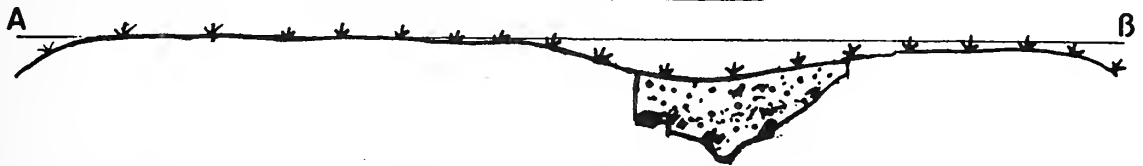
Three pounds of the charcoal-impregnated soil were

PIT AT ARDCHYLINE

NN105 058



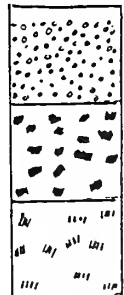
SECTION ACROSS A-B



CLAY

INTENSE BLACK

REDDENING



**FIG 7**

water-sieved, and one pound of charcoal was recovered, i.e. a proportion of 1:3 (33%).

### Conclusions

It seems very probable that this pit was constructed for the purpose of rendering wood into charcoal. The evidence of heat, and the lack of a flue, implies that a baking process rather than a burning process was used, and the amount of small fragmented charcoal in the soil suggests that charcoal was being made; the larger pieces would all have been collected and removed.

The small hole in the foot of the pit resembles a post hole, and could be a socket for a 'motty peg'. This is known to have been used in a charcoal pyre built on level ground. The pyre is built around it, and when ready for ignition the 'motty peg' is removed and the burning brand is dropped into the centre hole left by the removal of the peg.

It is probable that the pit was used on many occasions, and gradually became filled up with charcoal debris. Towards the end of the pit's use, when the clay floor was nearly level, the final pyres may have been built on the surface, thus causing the black soil to be immediately under the turf.

### Acknowledgements

To Mr. Angus Paterson for permission to dig on his land, and to Mr. Frank Newall and Mr. Harry Sinclair for help with the excavation.

### 5. Pit at Fearnoch. NS 02207695.

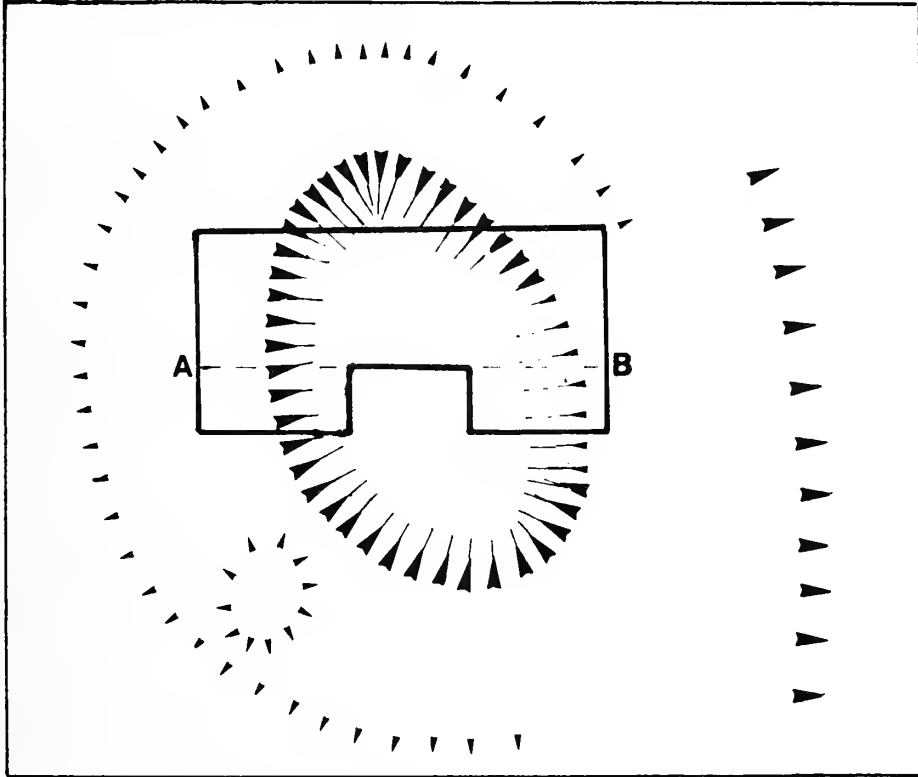
#### Excavation

This 'pit' or 'depression' is between two heather-covered knolls on a moor, immediately above a woodland of small birch trees flanking the Glechavoil Burn. Although surrounded by heather on three sides, the actual pit is in a patch of grass and bracken-covered ground at an altitude of some 360 feet. To the east, the hill-slope falls away to the birch wood below. At the time of the excavation (on 20th July 1989) the pit first had to be found under thick bracken standing 1.5 m high. The depression then appeared as an egg-shaped hollow within a slight banking, levelling out at a distance of about 1.0 m to 1.5 m. The hollow measured approximately 3.0 m x 2.0 m and was 0.25 m deep. Only a few hours were available for excavation, and so a minimum-sized trench cutting the centre of the hollow was opened (Figure 8).

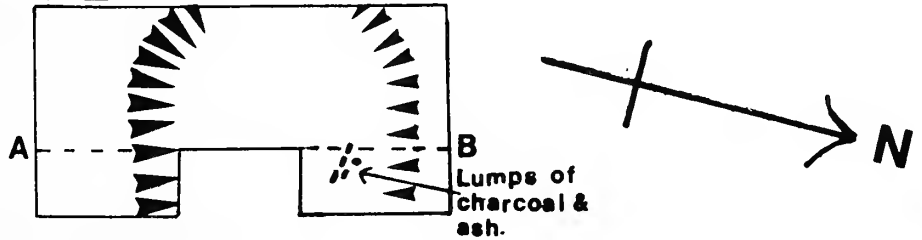
# PIT AT FEARNOCH, COLINTRAIVE

NS 02207695

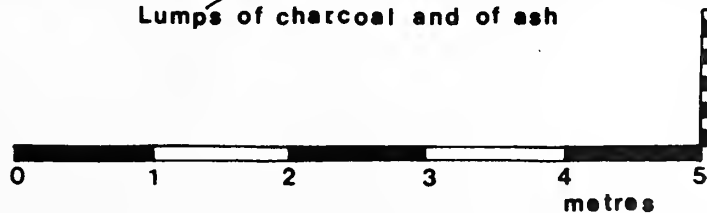
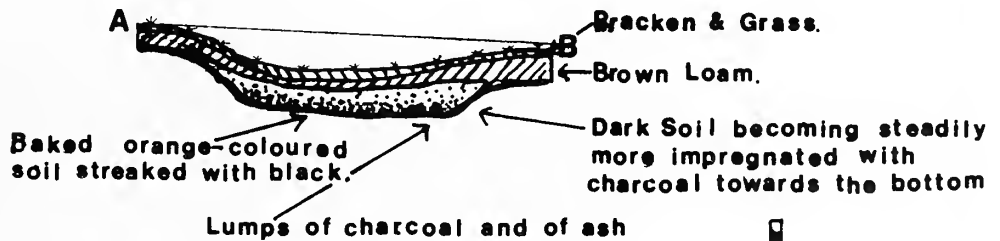
## SURFACE PLAN



## TRENCH PLAN



## SECTION ACROSS A-B



**FIG 8**

All of the soil, from top to bottom of the pit, was laced with bracken roots. At the extremities of the trench the soil was on a brown woodland loam, which darkened towards the centre.

On the west side, a firm base of light orange-coloured clayey-soil was found within 20 cm of the surface. The base sloped steeply downwards through ever-blackening soil to form a level bottom 0.5 m below the surface. The dark earth at the side of the pit was more clotted than in the centre.

The east side, which on the surface showed less evidence of the depression, was found to have a deeper layer of brown soil. Under it, there was a demarcation line between the dark soil and the brown soil, above the edge of the pit and marking the edge of the sloping side below.

The bottom of the pit was of a darker orange-colour and was extremely firm. It could be brushed clean, although patches of black staining remained. The bracken roots had not succeeded in penetrating the bottom, although the clay sides, particularly towards the top, were riddled with the roots.

Large pieces of half-charred wood, with bark still intact, and a lump of 'ash' were taken from the very black soil lying on the bottom of the pit.

### Conclusions

The pit has been intentionally dug, and lined with a poor clay. Intense burning had then taken place within it, baking and burning the bottom more heavily than the sides. Since charcoal was so prolific, particularly at the bottom, it is probable that the pit was constructed for the making of charcoal, i.e. as a pitstead.

It is possible that further excavation might have shown that the surrounding low bank was built of turf, perhaps initially taken from the pit during construction. Such a bank would originally have been higher, and would have added height to the pit and thus shelter to the charcoal pyre.

### Acknowledgements

To Mr. Andrew McIntyre for permission to excavate this pitstead on his ground. Also to Mr. Robin Callander, Miss Molly McNair, and Mr. Harry Sinclair for working so energetically and carefully on a hot sticky day.



## 6. Dunloskin. NS 16337905.

### Excavation

This pit is recorded in the lists in Appendix 1 as being between two water courses. It is cut into a knoll, not more than 8.0 m wide, which falls away steeply, into the bed of a burn on one side and into a dry watercourse on the other. The feature, even before opening, could be described as a 'pit', since it was 0.4 m deep and about 2.3 m wide.

A trench, 1.5 m wide and 3.0 m long, was cut across the knoll between the two burn beds (on 27.2.91). Immediately the soil in the pit was seen to be black and laden with charcoal. Burnt red patches and intensely black patches were encountered within 0.2 m of the grass line. Below, there was a level of naturally-laid clay without burning. In the centre there was an apparent socket, 0.2 m in diameter, which showed evidence of burning. This was equated with the socket ('motty peg') recorded at Ardchylene (NS 10500580) and so initially this layer of clay was thought to be the base.

Further investigation, however, showed that the clay had been laid to level up the pit, and below there were three or even four more levels of burning, with burnt clay packed between. Patches of reddening and blackening were found on each of these lower levels. (See Figure 9).

The primary base of the pit narrowed to a 'dished' bottom about 1.0 m in diameter. There was distinct evidence of burning on the bottom and at the different levels on the sides of the pit. The sides were extremely steep, and clay-lined throughout. The final depth of the pit was 1.0 m.

A bucket of soil, about six pounds, was washed to remove the charcoal from it. Nearly 10% was found to consist of charcoal. At first sight, this soil would therefore appear to be less concentrated with charcoal than the soil at either the Ardchylene or the Choraghasich pit, but this is not actually so, since the Dunloskin soil was so packed with clay that it was excessively heavy.

### Conclusions

The evidence suggests forcefully that the pit had initially been frequently used to make wood charcoal. Before a final use, a longer passage of time elapsed, and the final burning could not have been more than perhaps 100 to 150 years ago.

It is of significance that this pit is between three piles

# DUNLOSKIN PIT

NS 1633 7905

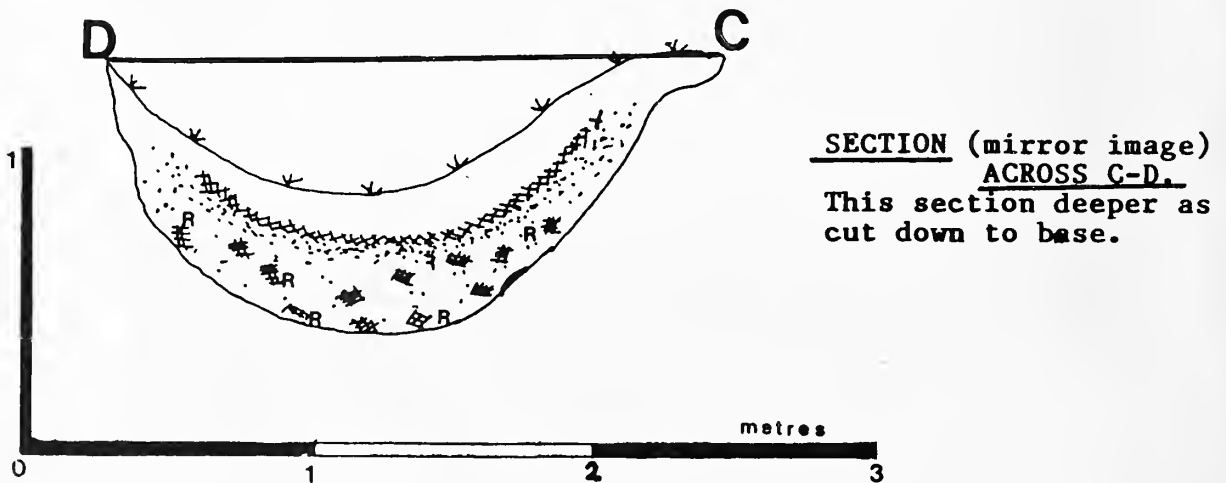
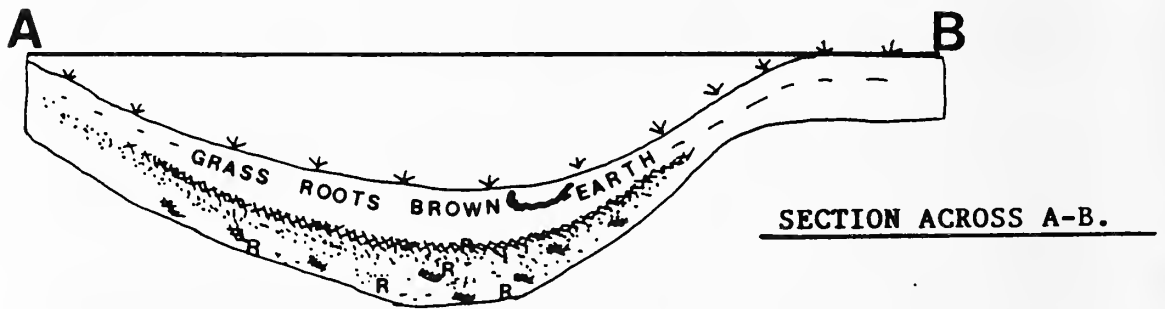
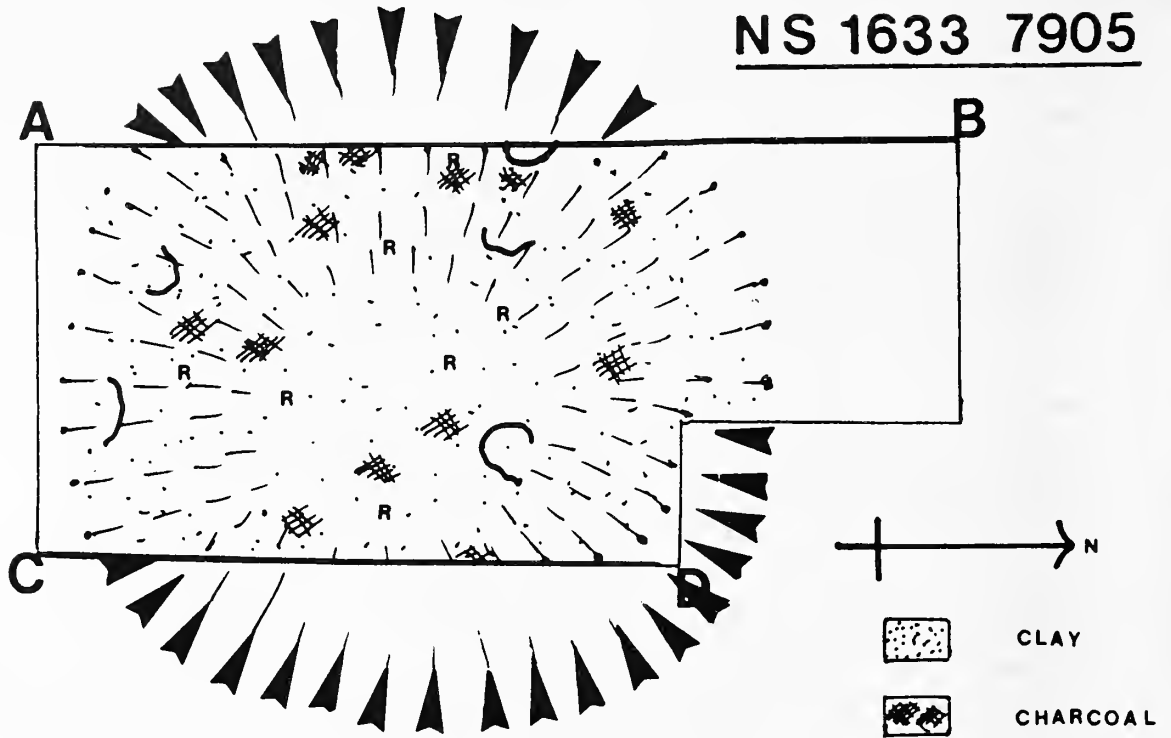


FIG 9

of slag, each of which is less than 100 metres away. It is also within 100 m of the Ardndadam enclosure, which has recently been excavated (Rennie 1984). There is another 3.0 m circular depression, which is probably a second pit, within 50 m. It is now impossible to find this hollow, because vegetation and fallen trees have masked the ground since the grazing animals were withdrawn from the hillside.

#### **Acknowledgements**

To Mr. Frank Newall and Mr. Harry Sinclair for much help with the excavation.

#### **7-9. Settlement on the Upper Kilail Burn. NR 943834.**

##### **Excavation**

Since pits 'n', 'o', and 'p' (see Figure 2) were considered to be representative of other features noted in this vicinity, they were chosen for excavation, and samples of the soil were washed.

Both before and after excavation (on 28.2.91) the three circles were very similar. All were embanked and were of much the same size. It was discovered after the tramping caused by the excavating that both 'o' and 'n' had smaller pits attached to them. The secondary pit, to the south-east of north, was also opened and found to have the same profile and same material forming the base.

The three pits were different from the other six which have been dug. They had flatter bases, were shallower, and showed no evidence of heat on the sides or base. However the bases were clay lined, and on the sides and floor there was black and brown flecking. The bases had a slight showing of white and yellow colouration. (See Figure 10).

About 3.5 pounds of material was taken from pit 'n'. Much of this consisted of water; this was washed out with a quantity of very black silt which passed through a 1.5 mm sieve. Left behind was about 1.0 pound of brown fibrous material and very fine gravel. There was also about 20 stones nearly 1.0 cm in size, some twigs, and three small pieces of slag, each about 1.0 cm in size.

As a control, and in the hope of finding a rectangular pit, one of the oval houses at 'j', in the angle of the Strone Farm road and Beallochandrain road, had a trench taken across it. No features were found in the opened area; the floor was tramped and firm but there was no colouration nor clay as found

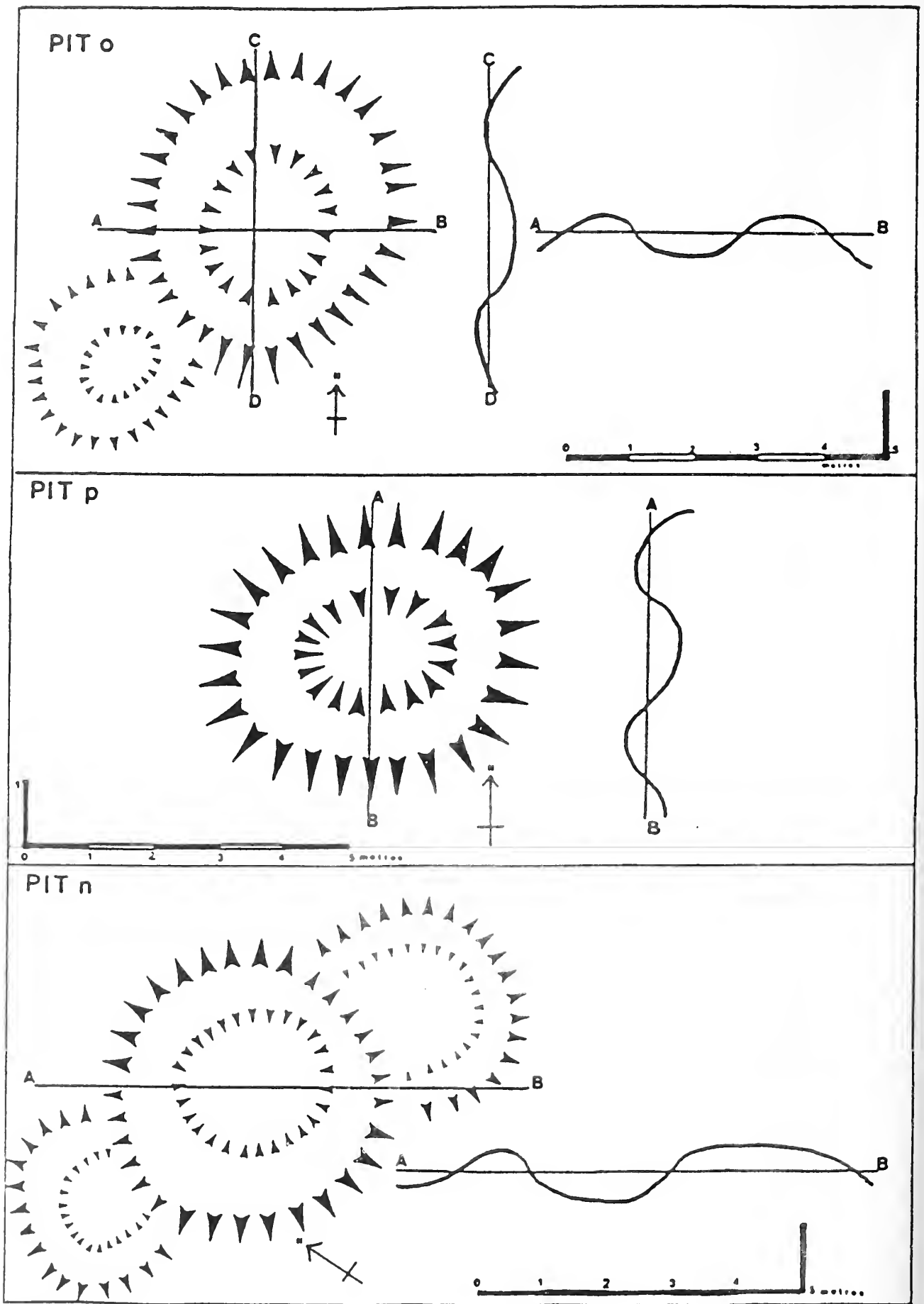


FIG 10

in the pits; the floor was on the same level as the exterior ground. There was a break in the end of the short south side between the low spread walls, and this was judged to be an entrance. This feature was considered to be some form of shelter or hut, and not a pit like the three circular ones.

### Conclusions

In spite of the lack of evidence of burning within the pits, it is postulated that these pits - the excavated ones and the similar ones recorded in the area, may be pits for the making of peat charcoal. They are set on ground, or surrounded by ground, which is peat and heather-covered today. The forestry ploughing illustrates the depth and spread of the peat. The 1860 maps show the same bare landscape in the last century. The great central slag heap demonstrates that iron was being made, and it is reasonable to suggest that the adjacent long houses were the homes of the iron makers. Therefore charcoal must also have been manufactured, and peat is the most abundant fuel in the area.

It is not known what deposit would be left from the making of peat charcoal, but it is known that peat ash is yellow, or even white coloured. The yellowish/whitish colour on the base of the pits may be peat ash. The lack of evidence of burning in the pits, which contrasts sharply with the other excavated pits, may be explained by suggesting that peat chars at a lower temperature than wood. The debris left in the foot of pit 'n' suggests that peat had been baked in that pit, and the three small pieces of slag could be very significant.

As a result of these three excavations, the assumption is that all of the 2.0 m to 3.0 m circular depressions, whether embanked or flat, and which do not appear to have an entrance and are found on or near the heather moors, are probably pits for the making of peat charcoal.

### Acknowledgements

To Mr. Frank Newall, Mr. Harry Sinclair, Mr. Hubert Andrew and Miss Molly McNair for much help with the excavation.

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1992

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## THE 1988 CENSUS OF GANNETS ON AILSA CRAIG

By J.A. GIBSON

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Scottish Wildlife Trust*

The 1988 census of the Ailsa Craig colony of Gannets *Sula bassana* again took the form of a one-day census made from the sea in early May, with the usual check counts of selected control areas later in the year.

### Present Population

The detailed counts for 1988 are given in Table 1, along with the usual comparative counts for the previous three years. As before, all are direct counts through binoculars of occupied nests, and all figures comprise the mean of several counts of each cliff-section, made at different times throughout the same day from the same counting-stations. Only occupied nests are counted; all Gannets not occupying nests are excluded. Control counts made later in the year (all of which again confirmed the figures of the one-day census in early May) are used only as checks, and are not included in the formal census.

### Increases

No further population 'crashes' have been recorded since 1975, and the Ailsa colony has continued to increase steadily each year. In some previous years this increase was at the rate of nearly 1,000 nests a year, but there is now a real indication of a reduction in this rate of increase. The increase reported for 1985 was 814 nests, for 1986 was only 231 nests, for 1987 was 569 nests, and this year (1988) is 392 nests. Nevertheless, the 1988 count of 24,003 occupied nests is again the highest population of breeding Gannets ever to have been recorded for Ailsa.

### The Cliff Colonies

For the annual census work the original sub-divisions of the Ailsa cliffs, as named in Table 1, have continued to be used virtually unchanged for the past half-century, but it is important to realise that, with the steadily increasing population, these natural divisions are no longer nearly so clear-cut and that in many cases individual neighbouring cliff colonies have largely merged into each other, or, in the case of the cliff-top colonies, have now spread significantly onto the

Table 1  
 Counts of Gannet Nests on Ailsa Craig  
 1985 - 1988

Total for each cliff section represents the mean  
 of several separate counts

<u>Colony</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Sliddery	371	390	399	402
Sliddery, Top Ridge	548	538	562	561
North of the Slunk	536	549	553	577
Foot of the Slunk	629	638	650	681
Above Ashydoo	299	307	343	387
Balvaar	1083	1098	1201	1243
Below Balvaar	306	322	329	371
Balvaar, Top Ridge	449	473	490	498
Balvaar to Cairn	562	589	599	593
The Cairn	2749	2783	2899	2851
Cairn to Mare	726	731	783	799
Barrheads	2498	2523	2508	2572
Above Black Holes	452	439	467	481
Mare	4301	4318	4292	4327
Mare, Lower Ledge	191	190	187	191
Above Bed o' Grass	322	341	352	370
Mare-Stranny Point, S1	593	602	628	656
Mare-Stranny Point, S2	648	639	686	684
Mare-Stranny Point, S3	893	931	940	976
Mare-Stranny Point, S4	985	997	1013	1038
Stranny Point, South Side	50	52	51	50
Main Craigs, Main Part	1396	1403	1439	1478
Main Craigs, Top	1573	1555	1589	1577
Main Craigs, East	481	478	489	491
Main Craigs, East Top	111	103	107	98
Main Craigs, Far East	-	-	-	-
Main Craigs, Far East Top	59	53	55	51
Grand Total:	22811	23042	23611	24003

grass-covered slopes at the tops of the cliffs. This tendency to boundary spread was actually first reported over twenty years ago (Gibson, 1970) but has markedly increased within recent years, so that some demarcation lines are now entirely artificial. Nevertheless, the cliff divisions under the long-established local names still have considerable relevance, so will continue to be used.

### Index of Room

As previously explained, there is now very little point in producing the annual 'index of room' available for Gannets on Ailsa Craig. For several years past, the extension and merging of the traditional areas of the Ailsa cliffs occupied by breeding Gannets has made the previous index of the amount of 'room' available for Gannets on Ailsa largely irrelevant (Gibson, 1983). Moreover, the 'index of room' was originally envisaged as a formula for estimating the population which the traditional Gannet cliffs could theoretically hold, but Gannets are continuing to utilise the sloping ground at the tops of the cliffs, where they are clearly now permanently established and are steadily extending their nesting areas, so, if this tendency continues (which is almost certain), obviously there is almost no limit to the size of the breeding population which Ailsa can hold. With the steadily increasing size of the breeding colony, the annual count is now virtually the same as the 'index of room' (Gibson, 1987), as one would expect.

### Future Work

With respect to any possible census work in future years, it has to be stated that there are now some marked difficulties in the way. With the increasing size and complexity of the Ailsa Gannet colony, and the consequent increase in the areas of 'dead' ground, the census method traditionally used, even such a precise method as direct counts of occupied nests under very rigidly controlled conditions, is now approaching the limits of possible accuracy. In particular, if the Gannets continue to spread onto the sloping ground at the cliff-tops, where the view of the breeding colonies is at a marked angle for anyone counting from the sea at a reasonable distance off-shore, then this increases the margin of error, and the annual count by traditional methods will no longer be able to provide the same degree of accurate comparison. This would be the case even for myself, i.e. the same observer using directly comparable methods over some forty-five years, and so would be unacceptable.

In the report of the 1987 census, however, I indicated that for health reasons it was likely that I would have to cease making the annual census in the not too distant future (Gibson, 1989 and 1990), and this has now come about. Unfortunately, increasingly severe osteoarthritis now makes it impossible, even with various devised supporting aids, for me to gaze up at the Ailsa cliffs for the sufficiently sustained periods of time required to make the counts with comparable accuracy. I had hoped to be able to complete fifty years of annual counts, but unfortunately this will not be the case and I must now cease. Nevertheless, I am glad to have been able to count the Ailsa Gannet colony for some forty-five consecutive years, which, interestingly enough, I am informed appears to be the longest-running annual census of a major island seabird colony anywhere in the world. Certainly it is the longest annual direct-count census of any Gannet colony.

### Previous Work

Direct counts of all occupied nests have now been carried out at the Ailsa Craig Gannet colony for over half a century. This work commenced in 1936, with a pioneer count by H.G. Vevers and James Fisher (Vever and Fisher, 1936), who, with a team of volunteers, managed to keep the annual census going, latterly under considerable difficulties because of war-time conditions, until 1942. Since the end of the second world war in 1945, when to begin with only curtailed counts and estimates of population could be used, I have managed to continue the annual census without a break. I must now accept, however, that this year (1988) will be my last annual Ailsa Craig Gannet census, although, possibly in the not too distant future, I hope to produce a summary of all the census work over the past half-century, with an account of any significant changes which have taken place.

### Conclusion

Since this is almost certainly the last annual Ailsa Craig Gannet census report I shall produce, for ease of future reference it is obviously desirable to include a comprehensive bibliography of all past Gannet census work on Ailsa since 1936, when accurate counting commenced. The published sources of all past census work, since the original pioneer count of 1936, are therefore listed below in chronological order, along with a few other relevant items which have a direct bearing on the Ailsa Gannet colony.

In conclusion, I should like to thank my old friends and colleagues, Gwynne Vevers and James Fisher, for over forty years of firm and enduring friendship, for providing the original impetus which set me off on the right track so long ago, for constant encouragement to keep going ever since, and for plentiful free criticism whenever they thought it necessary. Also my best thanks go to all members of the Girvan family, tenants of Ailsa for several generations, for unfailing hospitality over half a century; and to the Marquess of Ailsa for great personal interest and (very long ago) for generous spontaneous support immediately offered to a typically impecunious undergraduate.

Finally, I am also extremely grateful for the many tributes and expressions of appreciation received at the end of my long-running work on Ailsa. These came from all over the country, not just from old and valued friends and colleagues, but sometimes from quite surprising places, and all have been as warmly appreciated as they were unexpected. I have now been on Ailsa Craig every year for the past sixty years, in my early days sometimes for several months at a time during undergraduate holidays, and I still hope to make at least one annual visit to Ailsa for many years to come.

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## THE SPREAD OF THE GREY SQUIRREL INTO LOWLAND CLYDE

By J.A. GIBSON and I.W. GRANT  
*Renfrewshire Natural History Society*

### Increase in Glasgow Parks during mid-1970s

Just over ten years ago, in a previous issue of the journal (Gibson, 1981), it was reported that the long-established but small population of Grey Squirrels *Sciurus carolinensis* in Rouken Glen Park, on the south side of the City of Glasgow, had been showing clear signs of a substantial increase in numbers from about the mid-1970s, with animals regularly being reported from adjacent areas of Renfrewshire and Lanarkshire. Other Glasgow parks had also reported increases in Grey Squirrel population.

### Expected Spread South of River Clyde

Around that time (1981) something of a population explosion then took place in the colony of Rouken Glen Grey Squirrels. Because of this, it was generally considered to be merely a matter of time before widespread colonisation took place south of the River Clyde, which had apparently remained the natural barrier to the southern spread of the Grey Squirrel since its first introduction to the Clyde Area, at Finnart on Loch Long, in 1892 (Middleton, 1933), with subsequent rapid and extensive spread north of the River Clyde very quickly thereafter (Paterson, 1912; Watt, 1923; Bartholomew, 1933; Gibson, 1954).

This anticipated spread south of the river has now certainly taken place. Ten years ago the Grey Squirrel was becoming well-known in East Renfrewshire and West Lanarkshire, close to the Glasgow boundary, with animals regularly being reported from gardens all round the area, and as far afield as Williamwood Golf Course (Gibson, 1981). Several years later they were extending their range widely west and east, and by 1989, at least, they had reached the outskirts of Kilmarnock in North Ayrshire.

### Lines of Spread

Since then the Grey Squirrel has continued to spread widely. As far as can be ascertained, the initial spread appears to have been along four main lines:

- (1) Pollok - Paisley - Johnstone - Kilbarchan - Kilmacolm;
- (2) Barrhead - Uplawmoor - Beith - Dalry;
- (3) Newton Mearns - Stewarton - Kilmarnock - Irvine; and
- (4) Whitecraigs - Eaglesham - East Kilbride - Strathaven.

Cross-spread, however, was quickly achieved, with reports, usually sightings of single animals, soon coming from all over the intervening areas.

At any rate, regular reports now confirm that the Grey Squirrel has become widely distributed and well established, although as yet in small numbers, throughout East Renfrewshire, North Ayrshire, and West Lanarkshire, with a few scattered records further afield in all areas.

#### Previous Occurrences in Lowland Clyde

When Dr. Gibson wrote his revised survey of the Land Mammals of the Clyde Faunal Area in 1976 (Gibson, 1976) he was unable to give any genuine records for lowland Clyde; in fact, the only significant records of any kind south of the River Clyde came from Montgreenan and Eglinton Castle in Ayrshire - an initially successful introduction around 1919 (Watt, 1923), but later extensively shot and trapped, and eventually exterminated by the late 1920s (Gibson, 1976). Now Grey Squirrels are back in this area of Ayrshire, after a gap of nearly seventy years, but this time by natural spread.

#### Grey Squirrels Now Established South of River Clyde

The Grey Squirrel is therefore now well established south of the River Clyde, and is likely to remain so. No doubt records from areas adjacent to those already colonised will follow quite soon, and Dr. Gibson, in his capacity as Clyde Area Recorder on behalf of the Mammal Society of the British Isles, will be glad to hear of any additional information, in order to chart the spread.

#### Future Problems for Red Squirrel

Nowadays the position is that any report of 'squirrels' south of the River Clyde must be assumed to be Grey, unless proved otherwise, i.e. a complete reversal of the position a generation ago.

With the great reduction in the numbers and distribution of the Red Squirrel *Sciurus vulgaris* in lowland Clyde during the past 30-40 years (Gibson, 1954 and 1976), and now this invasion by the more adaptable Grey Squirrel, it would appear that any future chance of the Red Squirrel getting properly re-established south of the River Clyde must now be regarded as remote.

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## SHORT NOTE

## CLOUDED YELLOW BUTTERFLY AT KILCHATTAN BAY; NEW RECORD FOR THE ISLAND OF BUTE

On 17th May 1992 I caught (examined and later released) a specimen of the Clouded Yellow butterfly *Colias crocea* at Kilchattan Bay, Island of Bute. This is my first personal record for the island, and I also believe it to be the first recorded occurrence for Bute. It is certainly an addition to the recently published check-list of the butterflies of the Island of Bute (Gibson, 1990).

It is a common experience of all local recorders that no matter how long one waits before publishing, it is only just after one has gone into print that something new or unusual arrives, and this Clouded Yellow was no exception. I published my paper on Bute butterflies, after some fifty years of collecting records, in 1990, yet it was only some eighteen months later that this first specimen of the Clouded Yellow was recorded for the island.

This occurrence on Bute, of course, was clearly part of the remarkable invasion of Clouded Yellows throughout the West of Scotland, and other parts of the country, from the middle of May onwards earlier this year (1992), and I would not normally consider it worthy of a separate note, were it not for the fact that it was an addition to the Island of Bute butterfly check-list published so recently, and that it is likely to be a few years before the next volume of the Buteshire Natural History Society's *Transactions* appears.

It would be very surprising indeed if this were the only specimen of the Clouded Yellow butterfly to have made its way to Bute during the recent invasion, but despite extensive local enquiries I have not, as yet, managed to discover any other occurrences. Needless to say, I shall be very glad to hear of any additional records.

GIBSON, J.A. (1990). The butterflies of the Island of Bute. *Transactions of the Buteshire Natural History Society*, 23: 41-45.

J.A. Gibson





## BOOK REVIEW

JACKSON, C.E. (1992). *Prideaux John Selby: A Gentleman Naturalist*. Stocksfield, Northumberland: The Spredden Press. Pages i-viii, 1-191. Illustrated. ISBN 1-871739-26-8. £25.00.

Prideaux John Selby (1788-1867) was a wealthy Northumberland landowner, a friend and colleague of Sir William Jardine of the *Naturalist's Library* fame, and a very distinguished artist and naturalist in his own right, who, amongst many other things, personally produced the first-ever book on British birds to illustrate all species in their natural size.

This magnificent work appeared in nineteen parts between 1821 and 1833, later collected into two imperial folio volumes, and finally earned Selby the sobriquet of the 'British Audubon'. In truth this really should be reversed, for Selby's *magnum opus* appeared several years before Audubon's (1827-38), and so had the prior distinction of being the first major ornithological work to display birds life size. These two justly famous volumes contain over 220 magnificent plates, with some 200 drawn by Selby himself from specimens in his own collection.

When Audubon came to Britain, the two men, and also Sir William Jardine, became friends, and Selby and Jardine undoubtedly assisted Audubon a great deal, but later a coolness developed, and in this the fact of Selby's own celebrated work appearing first may well have had a bearing.

P.J. Selby was obviously a gifted artist, and also one of the leading ornithologists of the 19th century. It is unquestionably for his renowned *Illustrations of British Ornithology* that he is best known, but he was many more things besides this. His *History of British Forest Trees* (1841-42) deserves to be better known, he published a long series of scientific papers in numerous learned journals, and he was principal Editor of the *Annals and Magazine of Natural History* from its commencement (as the *Magazine of Zoology and Botany*) for thirty years until his death in 1867.

It therefore seems remarkable that no major biography of Selby has appeared before now, for an account of his life, and of his pioneer natural history work of such great merit and value, was clearly long overdue. It can be said right away that Christine Jackson's book has been well worth waiting for, and

fills this undoubted gap in scientific historical literature most admirably.

Christine Jackson is a well-known author of works on bird illustration, with several distinguished publications already to her credit, so it was possibly not surprising that she should have turned her attention to Selby, with his famous ornithological works, as her next task. Indeed she had already gone some way towards this, with her simply splendid introduction to the catalogue for the 1989 sale of Selby's water-colours, by Sotheby's in New York.

As all readers of Mrs Jackson's previous works will already know, as well as having an enviable and well-deserved reputation for the depth and accuracy of her historical and biographical research, she also possesses an admirably fluent and easy style of writing. In this latest book, she presents all the essential facts about Selby the man and his work, but she also does so in a manner which is a real pleasure to read, a benefit which is by no means universal in serious scientific or bibliographical works.

The book is constructed in twelve main chapters, with an end section of copious notes and references for those interested in further research, and also includes a most comprehensive bibliography of publications by and about Selby. The volume is well printed in a pleasant type-face, and is most generously illustrated with very relevant coloured and black and white plates, figures and tables, well positioned throughout the text, and all told the printers and publishers have produced a volume which is a pleasure to handle, and worthy of the truly admirable scholarship of the author. Only those who have themselves attempted similar biographical and bibliographical research will realise the immense amount of intensely hard work this entails, and it can be well said that Mrs Jackson has performed her task outstandingly well.

This book is a first-class contribution to our knowledge of 19th century natural history. No-one interested in Selby could possibly wish for more (unless, of course, a present of his two imperial folio volumes!). Highly recommended.

J.A. Gibson

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